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Paper TRADE JOURNAL

REG. U. S. PAT. OFF.

VOLUME 126, No. 20 MAY 13, 1948

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**Volume 126** **Number 20**

# Paper TRADE JOURNAL

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## CALENDAR OF COMING EVENTS

May 19, 20, 21, 1948—American Pulp and Paper Mill Superintendents Association, Annual Meeting, Roosevelt Hotel, New Orleans, La.

June 11-12, 1948—Paper & Twine Association, Annual Convention, French Lick Springs, Indiana.

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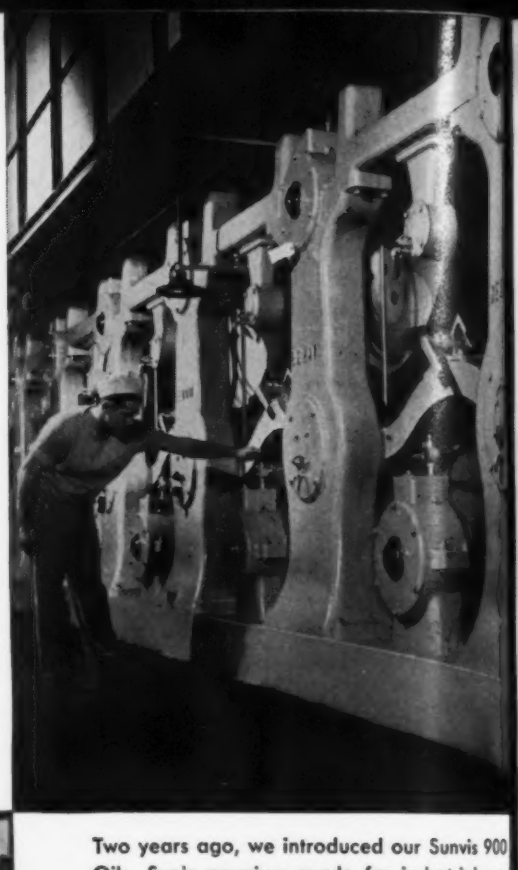

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Paper TRADE JOURNAL

VOLUME 126, NO. 20 REG. U.S. PAT. OFF. MAY 13, 1948

## Thomas Luke Passes —W. Va's Chairman

NEW YORK—Thomas Luke, 77, chairman of the board of directors of the West Virginia Pulp & Paper Co., died of a heart ailment at 10:40 a.m. Wednesday at New York Hospital after an extended illness. Mr. Luke, who had been a leading figure in the pulp and paper industry since the turn of the century, was associated with the firm in varying capacities for 56 years. He was its president from 1934 until he retired from active management in 1945.

Funeral services will be held at Irvington Presbyterian Church, Irvington, N. Y., at 2:30 p.m., May 14. Interment will be private.

Mr. Luke was one of six sons of William Luke, a Scottish paper maker, who joined their father in a family enterprise which became the West Virginia Pulp & Paper Co., one of the world's largest manufacturers of book and magazine paper. Sole remaining survivor of this group is Adam K. Luke, Mr. Luke's brother, who formerly was treasurer and vice-president of the company and is now vice-chairman of the board of directors.

Thomas Luke joined the family enterprise in 1892. He was one of the dominant figures in the growth and progress of the company, serving for 22 years as vice-president and guiding its destinies as president for 11 years. He had been a director since 1905.

*(Continued on page 22)*

## Continental Can Starts Work on New Plant

ST. LOUIS, MO.—A new Continental Can Company paper converting plant for the manufacture of "Leverpak" fibre shipping drums, now under construction in St. Louis County, is expected to be finished and in production by February 1, 1949, according to J. F. Price, general manager of Continental's Paper Division. Designed specifically for efficient paper conversion operations, this modern factory will comprise approximately 200,000 square feet. It will be located on a 43-acre plot at 8341 St. Charles Rock Road and the Terminal Railroad.

A contract to erect the plant was awarded to the Fruin-Colnon Company of St. Louis on April 19. Grading and foundation work was started immediately.

Manufacturing equipment for the new plant has been under construction for many months and will be ready for delivery and installation as soon as the new building is completed. This will be the fourth Continental plant devoted exclusively to the manufacture of fibre shipping drums. The other three, operated by The Container Company, a Continental subsidiary, are located in Van Wert, Ohio; Reading, Pennsylvania; and Tonawanda, New York.

## Western Waste Dealers To Meet in Detroit

DETROIT — The Western Division of the National Association of Waste Material Dealers will hold a one-day meeting at the Hotel Statler on Tuesday, June 15, according to Morton A. Friedman, chairman of the Western Division. There will be two separate meetings held on Tuesday afternoon, one a joint meeting of the Waste Paper and Rag interests and the other a joint meeting of the Metal groups.

A dinner, to which the ladies are cordially invited, will be held in the evening.

From past meetings held in Cleveland, Chicago and St. Louis it is believed a large attendance will be present at this Detroit meeting. Hotel accommodations should be made direct with the Hotel Statler, Detroit, and it is requested that dinner reservations be made in advance through Morton A. Friedman, chairman, Western Division, N.A.W.M.D., 5429 W. Roosevelt Rd., Chicago 50, Ill., or Joseph Epstein, secretary of the Western Division, N.A.W.M.D., 1623 Lumber St., S., Chicago 16, Ill.

## New England Council Would Spread Shut-Downs

BOSTON, MASS.—New England's paper manufacturers have been warned against too many plant shutdowns for employe vacations in July. They were urged, instead, to extend the vacation season to June and September.

The Industrial Committee of the New England Council sent letters to all paper manufacturers in the six-state area, pointing out that simultaneous closings—adopted in the war years—is now throwing peak loads on resorts and transportation services. The letter added:

"Congestion, confusion and dissatisfaction result when facilities do not prove adequate for these peak loads."

## N.L.R.B. Supervises Wisconsin Elections

WAUSAU, WIS. — Union shop elections, as provided under the Taft-Hartley law, were conducted last week by the Minneapolis regional office of the National Labor Relations board at a number of Wisconsin paper mills.

The balloting was held from May 10 to 14. Employes indicated whether they wished to authorize the union with which they were concerned to enter into an agreement with their employer which requires membership in the union as a condition of continued employment.

Three elections were held by employes in three categories at the Nekoosa-Edwards Paper company which has plants at Port Edwards and Nekoosa. The Port Edwards workers voted on May 12 and the Nekoosa workers on the following day. The unions concerned are Nepco Local 59 of the International Brotherhood of Paper Workers, AFL; Nepco Local 52 of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, AFL; and Lodge 1543, International Association of Machinists.

On May 12 employes of the Rhinelander Paper company, Rhinelander, concerned with Local 91 of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, AFL voted on the union shop question.

On May 10: Wausau Paper Mills company, Brokaw; Local 260 of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, AFL.

May 11: National Container Corporation of Wisconsin, Tomahawk; Local 248 International Brotherhood of Pulp, Sulphite and Paper Mill Workers, AFL.

May 14: Mosinee Paper Mills company, Mosinee; Local 316 of the International Brotherhood of Paper Makers.

And May 14: Tomahawk Pulp Company, Inc., Tomahawk; Local 430 of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers.

Employes of the Ahdawagam Paper Products company at Wisconsin Rapids on May 3 confirmed the existing union shop policy by a vote of 158 to 3. It authorized Local 195 of the International Brotherhood of Pulp, Sulphite and Paper Mill Workers to enter into an agreement with the company requiring union membership. Ten employes abstained from voting.

## Deviny Sworn In As Public Printer

WASHINGTON, D. C.—John J. Deviny, a career man with many years of experience in the Federal service, was sworn in last Thursday as fourteenth Public Printer of the United States. The oath was administered by Judge Andrew M. Hood, of the Municipal Court of Appeals for the District of Columbia. The new Public Printer was appointed on March 15 by President Truman and confirmed by the Senate on Friday, April 30, to succeed A. E. Giegengack, who resigned to accept a private position. Mr. Deviny had been Deputy Public Printer since 1941.

The swearing-in ceremony was held in the Public Printer's office at the Government Printing Office before the members of the Congressional Joint Committee on Printing and other Federal officials with whom Mr. Deviny had served, representatives of printing house organizations in which he had been active, officers of local and international printing trades unions, Government Printing Office officials, members of his family, and invited guests.

## Engert Made Manager Of Gary Paper Mill

BUFFALO, N. Y.—George Engert has been appointed general manager of the Gary Paper Mills, Inc., for the new mill that is under construction at Gary, Indiana, for the production of newsprint from waste news using the Sterling pulp process. Mr. Engert has had considerable experience in operating paper mills and has assisted in putting two of the Southern mills into operation.

He severed his connections with the Cheney - Bigelow Wire Works five weeks ago. After spending a few weeks in Florida visiting his son, he came back north to take this position.

Work on the Gary Paper Mills is reported as proceeding very satisfactorily. The steel structure is completed and the bricking in of the mill is now in progress. This mill is to be running about the middle of August.

## Jansen Retires With No-Accident Record

KIMBERLY, Wis.—After 43 years of service with Kimberly-Clark Corporation, Adrian Jansen retired on a pension May 10. During his long service he never had an accident, either on-duty or off-duty. Jansen began work in 1905 at the Kimberly mill. He has been employed in the beater room since 1917.

Four K-C employes at the local mill joined a Quarter Century Club during the first quarter of 1948. They are Anton Ermers, Henry Van Cuyk, Emil Borchardt and Paul Gostas.

A clean-up and safety week program was given May 6 at the clubhouse, with more than 900 employes attending. The Kimberly mill has operated 91 days without a lost-time accident, according to J. T. Doerfler, manager. Ron Evans, mill engineer, was master of ceremonies. John Boettcher, Appleton, presented a juggling act, and a movie, "How Fires Start in Industry," was shown.

## Hall Promoted to Marinette Post

CHESTER, Pa.—George Hall, utilities maintenance engineer at Scott Paper Co., has been promoted to be utilities superintendent at the Marinette, Wis. plant, Marinette Paper Company.

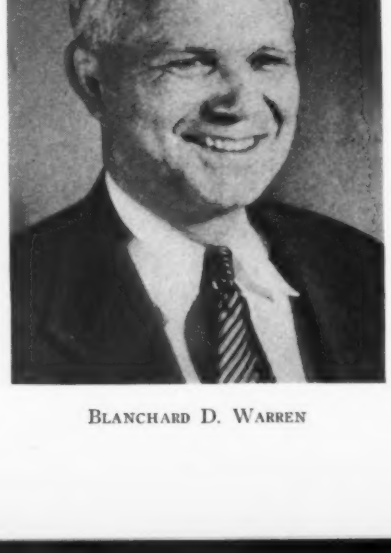
In his new capacity, Mr. Hall will head a new department responsible for steam, electric and water power, both in operation and in maintenance. It is expected that this grouping of all utilities at Marinette will result in increased efficiencies, between planning, and will permit greater flexibility.

Entering the employ of the company in 1935 and with the exception of three years in the Service, Hall has worked in the utilities department ever since. He began as a fireman, was promoted successively to turbine operator, relief shift engineer and maintenance engineer.

## Bird Machine Names Warren Assistant Sales Manager

SOUTH WALPOLE, Mass. — F. F. Frothingham, vice - president of Bird Machine Company, has made known the appointment of Blanchard D. Warren as assistant sales manager.

Mr. Warren has been associated with the company for twenty - two years. Graduating from Massachusetts Institute of Technology, Class of 1924, he was with H. K. Ferguson Company before coming with Bird. Mr. Warren has a wide acquaintance throughout the pulp and paper industry because of his long and active association with his company's sales department.



BLANCHARD D. WARREN

## White-Wyckoff Foremen Welcome Hodges

HOLYOKE, Mass.—Andrew S. Hodges, Jr., newly-appointed superintendent of the White and Wyckoff Manufacturing Company, was guest of honor at a recent meeting of the Foremen's Club of that firm, held at the Roger Smith Hotel. Mr. Hodges will join the White and Wyckoff firm about May 10, coming from Springfield where he is associated with the Indian Motorcycle Co.

William Daunheimer, president of the club, conducted the meeting, with Miss Mary Frodyma, forelady in charge of stationery samples, acting as chairman of the program. Mr. Hodges was introduced by President Harry C. Dutton of the company, who also commended Herbert Gray, foreman of the stationery department, for his work as acting superintendent since February.

Herman Mekler, foreman of the raw stock materials department, was named program chairman for the next meeting. Besides the foremen and company officers, several department heads of the White and Wyckoff organization were present to welcome the new superintendent.

## N.A.M. Assigns Williamson To Community Cooperation

SPRINGFIELD, Mass.—George E. Williamson, president of the Strathmore Paper Company, of West Springfield, has been named by the National Association of Manufacturers to the Committee on Cooperation with Community Leaders. The committee, which will function for a year, is among several set up to formulate policy recommendations on various industrial and economic issues, both current and long range. Business leaders, representing companies throughout the country, make up its membership.

## Jessop Names Marion Executive Vice-President

WASHINGTON, Pa.—Edward M. Griffith has been appointed executive vice-president of the Jessop Steel Company. Mr. Griffith has been in the steel business 45 years and prior to the war was president of the Defiance Pressed Steel Company, Marion, Ohio. During the war he served as a civilian with both Army and Navy Ordnance and with the Army was in charge of the 20-mm. program.

## Scherff Wins Award For Plymouth Ads

PLYMOUTH, Mass. — William A. Scherff, advertising manager of the Plymouth Cordage Company, has been named "Ad-Man-of-the-Year" by Industrial Marketing Magazine for his 1947 advertising campaign, judged as the best of the campaigns of industrial concerns in the United States. Mr. Scherff's advertisements stressed useful information about rope.

## Ewing Joins Whiting As Vice-President

SPRINGFIELD, Mass. — Rufus D. W. Ewing, prominent in the paper manufacturing industry in the Connecticut Valley, has resigned as president and director of the Holyoke Card and Paper Company, of this city, to become vice-president of the Whiting Paper Company, in Holyoke. James P. Smith, chairman of the board of directors of the Card and Paper Company, said he would assume the presidency of the firm for the time being, and that he has resigned as treasurer. R. W. Alderson, formerly assistant to the president at Milton Bradley Company, and before that controller of the American Tissue Mills, was elected as treasurer of Holyoke Card and Paper.

Mr. Ewing entered the paper business in 1911 with the wholesale paper house of Tileston and Livermore of Boston. In 1912 he came to Holyoke with American Writing Paper Corporation. Late in 1913 he was transferred to sales and assigned to the New York office, where he stayed until World War I broke out in 1917. He served in the Navy with the rank of lieutenant (j.g.).

After the war, Mr. Ewing becamc manager of the New York office of American Writing Paper, where he stayed until 1928. In that year he moved to Holyoke to become assistant sales manager. The following year he was elected secretary of the company and promoted to general sales manager, and in 1930 he became vice-president. He left American Writing Paper in January, 1943, for the presidency of Holyoke Card and Paper Company.

Mr. Alderson was controller of American Tissue Mills from 1936 to 1944.

## Cowles Completes Plant At Skaneateles Falls

CLEVELAND, Ohio — The Cowles Detergent Company has completed a new million dollar plant at Skaneateles Falls, New York. One of the most modern chemical plants in the country, it is equipped with up-to-date technological equipment for the manufacture, packaging and shipping of the Cowles line of heavy chemical detergent silicates as well as the company's line of specialized detergents for the commercial laundry, metal cleaning, food sanitation and other fields.

The company's plants at Lockport, N. Y., and Sewaren, N. J., are operating at capacity. Addition of the new plant at Skaneateles Falls, where operations have already commenced, makes it possible for the company to expand production to the point where deliveries can be effected more promptly and in increased quantities. It also enables Cowles to expand sales in the industries now served as well as reach new markets not previously touched. Completion of the new plant is indicative of the company's determination to improve constantly its products and the services it renders customers in all fields.

## Commerce Department Extends Its Record

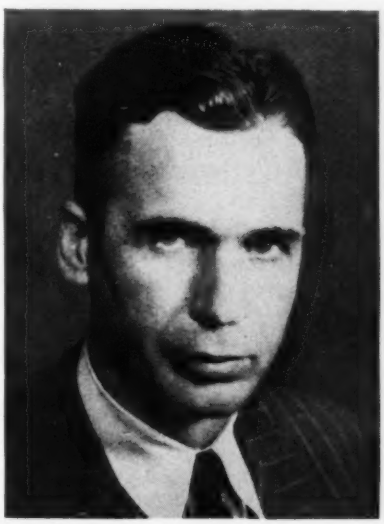
WASHINGTON — The Office of Business Economics of the Department of Commerce has broadened the coverage of its monthly series on manufacturers' sales and inventories, under a revision announced this week. As a result, said the Department, the levels of sales and inventories have been increased.

The new estimates include all activities of manufacturing companies, whereas the prior series covered sales and inventories only for plants actually engaged in manufacturing. Thus extracting and selling operations of a manufacturing corporation would not be included in the totals, where formerly excluded.

The revision, it was stated, raised the value of manufacturers' sales for 1947 to $185.7 billion and the year-end book value of inventories to $28.0 billion.

## Spratt Heads ACL Forestry Department

WILMINGTON, N. C. — J. R. Spratt has been appointed manager, Forest and Land Development, Atlantic Land and Improvement Company, with headquarters at LaBelle, Florida, and will manage the lands of that company in Hendry, Lee, Collier, and Polk Counties, Florida. Spratt, former Assistant State Forester for North Carolina, will be in charge of the development and management of approximately 230,000 acres of land in central and south Florida.



J. R. SPRATT

## Expect Coosa River To Operate By 1950

NEENAH, Wis.—Within two years, about 720 new employes and 1,500 men in the woods operation are expected to be turning out 100,000 tons of newsprint and 50,000 tons of sulphate pulp per year in the Kimberly-Clark corporation's newest plant, the Coosa River project at Birmingham, Ala.

Power for the new plant is furnished by a government power plant that has six 200,000-pound boilers, making its total capacity one third greater than all present Kimberly-Clark installations combined.

A pumping station, together with the government filter plant, will make it possible to pump, screen and filter over 23 million gallons of water per day.

Kimberly-Clarkers at the Coosa River project include A. G. Wakeman, vice president and general manager, who formerly was with the K-C main office expansion staff; W. E. Hornbeck, resident mill manager, formerly head of staff materials; John Raeburn, woods manager, formerly with the woodlands division; Clarence Lande, plant engineer; formerly field service engineer; Howard Neubauer, office newsprint sales manager, formerly head cost clerk at Lakeview, and W. W. Cross, newsprint sales manager, formerly head of Kimpreg.

Kimberly-Clark corporation has a contract with the Coosa River Newsprint company which was conceived by a group of southern businessmen and newspaper publishers, to build and have complete management responsibility of the 30 million dollar mill.

The millsite includes 615 acres of land in the 18,000 acre federal reservation in the county of Alabama, purchased from the war department. The company also has leased from the war department a number of buildings where smokeless powder was manufactured during World War II, including a 25,000 kilowatt steam power plant and a water system with a pumping station.

Plans include a 2-machine newsprint mill as well as a large pulp mill that will supply pulp to Kimberly-Clark's new cellu-cotton wadding mill at Memphis.

## Frank C. Arnold Joins Moore & White Company

PHILADELPHIA—Frank C. Arnold, a paper mill engineer for more than twenty years, has joined The Moore & White Company as a development engineer covering winders, layboys and cutters.

In 1925 he joined Parker & Young, papermakers at Lincoln, N. H. In 1940, he spent several months with the Waterfalls Paper Company, Mechanics Falls, Me. He then went to Rumford, where he was with the Oxford Paper Company, and remained until he took his present position with Moore & White.

## See Waterway Plan Bringing Benefits

SPRINGFIELD, Mass. — Long interested in the project as having a direct effect on their future economical operations, papermakers throughout New England have learned that Governor Thomas E. Dewey of New York has ordered state officials—working through the federal government — to negotiate an agreement with Canada for development of the vast power resources of the St. Lawrence River.

In a surprise move, Dewey directed the New York State Power Authority to seek federal approval of talks with the Province of Ontario on a $300,000,000 power development program in the St. Lawrence. It was understood that New York State would contribute $161,000,000 of the cost, to be financed by self-liquidating bond issues.

A source close to the governor said the state's action was prompted by the United States Senate's defeat of the St. Lawrence Seaway and Power project. He emphasized, however, that the hydro-electric development would not affect future approval of the proposed seaway linking the Great Lakes with the Atlantic Ocean.

The proposed power project was expected to develop 2,200,000 horsepower which would produce for New England and New York 6,300,000,000 kilowatt hours of low-cost hydro-electric energy a year.

Under the boundary waters treaty of 1909-10, private individuals, corporations and governments may negotiate through the Federal Administration for permission to develop power sites on the St. Lawrence. This is the opinion of Dewey's top legal advisers.

The development, if approved by the Federal government, will provide needed power to New York and the New England States. During the past four years, according to the New York Power Authority, that state has imported an average of 2,500 million kilowatt hours of hydro-electric energy a year from Canada to meet the minimum requirements of the State.

The power dam and development would be located at Long Sault in the International Rapids section on the New York-Ontario frontier, between Ogdensburg and Massena.

It was learned that Dewey has decided that the state no longer can do without the additional power needed since the demand for electric energy has increased, rather than diminished, since the end of the war.

The project would not be a burden on New York taxpayers, it was learned, since the power authority could issue bonds covering the state's share of the development by a charge of 2 mills per kilowatt hour for electricity.

The Province of Ontario was said to be just as anxious as New York State to develop the mutual power project.

Dewey's action was the first concrete attempt by the state in more than 25 years to cut through red tape for development of St. Lawrence seaway power potentialities.

## Virginia Paper Firms Sign Wage Contracts

RICHMOND, Va.—According to Robert Turner, field representative of United Paper Workers of America (CIO), three local paper firms have agreed to contracts during April which provide for higher wages for almost 1,000 workers.

"About 300 workers in the bargaining unit at Albemarle Paper Company received a 10 cents an hour across the board increase," Mr. Turner said. "The new contract, with Local 690, grants an additional holiday with pay, 48-hour work week and contains an automatic wage reopening clause effective in six months.

"About 525 workers at Wortendyke Manufacturing Company are affected by a new agreement with Local 692 granting 10 cents an hour across the board increase in addition to five cents an hour to be added to minimum rates," he continued.

"An average increase of 5 cents an hour and shift differentials of 8 and 12 cents an hour are among terms of an agreement between Hopper Paper Company and Local 696 with some 100 people affected. This represented the third increase in 12 months for these employes.

"Retained in the last two contracts are provisions for six holidays with pay and free hospitalization insurance," the field representative said.

He also made known that following an election, the union has been certified by the National Labor Relations Board as sole bargaining agent for production and maintenance employes at Meade Paper Products, Inc., Lynchburg.

Also elected were 20 vice-presidents and three trustees. The vice-presidents, who with the top three officers make up the union's executive council, include Boyd E. Payton, of Lynchburg, Va.

### Franks In Boston For H. K. Porter

PITTSBURGH, Pa. — Lawrence A. Franks has been appointed manager of the Boston district office of the H. K. Porter Company, Inc., by W. W. Calihan, director of sales for the company. Mr. Franks, a graduate of Tufts College, formerly was with Bird and Sons, Inc., as a sales engineer and spent some time with the Metal Glass Products Company. He is wellknown throughout the northeast, having been contacting industrial New England for the past eight years.

Mr. Franks will be located at the H. K. Porter Company, Inc., Boston office, 294 Washington Street, Old South Building, Boston 8, Mass.

## New England Opens Wage Rate Talks

HOLYOKE, Mass. — Another meeting of representatives of the paper manufacturers and mill workers' unions to discuss a new wage schedule will be held in the near future. Meanwhile, officers of Eagle Lodge and the Paper Mill Works, Local 226, both affiliated with the American Federation of Labor, have made reports to members of their respective organizations of the progress of negotiations to date.

At the first meeting, held at the office of Harold T. Martin, labor counsel for the manufacturers, a committee comprising Edward C. Reid of the American Writing Paper Corporation; Elmer C. Tucker of the Chemical Paper company, and Crocker-McElwain Company; and Henry V. Burgee of Parsons Paper Company, met with union officials. The latter delegation was headed by International Organizer Edward M. Moore, and also contained Edmund Brugle, Euclide Marchand, Andrew Beaton, Edward Zackzrewski, Edward Daley, John A. Houlihan and Philip Ryan.

This marked the first meeting in the present negotiations between the manufacturers' committee and the two unions. The manufacturers expressed the belief that the 25-cent honrly wage boost demand on the part of the unions is too high, but, according to Moore, have yet to offer a counter proposal. The unions want a minimum wage scale of $1.14½ hourly, and a maximum of $1.62, plus increased insurance and medical benefits.

The first session was devoted to a review of business operations in the trade generally at the present time. It was brought out by the manufacturers' representatives that shorter working schedules are in effect in local paper mills, due to a drop in business, while the union men stated that even with a wage scale as demanded, local pays would not come up to scales paid elsewhere in the industry.

### A.F.L. Loses in Smith Elections

LEE, Mass. — In two employee elections held at Smith Paper, Inc., office workers at the plant voted 28 to 23 against joining the International Union of Office Workers, AFL. In another election, 24 employees voted 13 to 11 to leave the International Paper Makers Union, AFL, to join the International Union of Operating Engineers and Powerhouse Employees, AFL.

The two elections were held under the supervision of the National Labor Relations Board. The board ordered the elections following hearings held in Pittsfield last January.

The elections establish another collective bargaining unit in the Smith Paper mills. The operating engineers and powerhouse employees still have to vote on the question of the open versus the union shop.

## New England TAPPI To Meet at Swampscott

SWAMPSCOTT, Mass.—The New England Section of the Technical Association of the Pulp and Paper Industry will hold its annual meeting at the New Ocean House, May 20-21, 1948. Chester H. Child of the Merrimac Paper Company will be general chairman.

On Thursday afternoon, May 20, there will be a visit to the Everett plant of the Monsanto Chemical Company. Following the dinner there will be a meeting to elect officers and to hear technical papers. The following papers will be presented:

"Testing Packaging Materials Under Military Specifications," by Clinton K. Royce, executive vice-chairman, Navy Packaging Board.

"Times Have Changed — So Have Packages," by W. H. Deveneau, sales promotion manager, National Folding Box Corporation.

On Friday morning, May 21, a motion picture will be shown, entitled — "Manila Waterfront." This shows the damages occurring in a typical bad port under present day conditions. The following papers will be presented:

"The Hazards of Export Shipping," by John Mount, manager of Marine Service Division, North American Companies.

"V—Boxes for Export," by H. T. Barker, Bird & Son, East Walpole, Mass.

There will be a demonstration of the high retentive strength under extreme moisture conditions of the Vus shipping container compared with the domestic type containers.

In the afternoon there will be a golf tournament at the United Shoe Machinery Company golf course, Beverly, Mass.

Following the New Ocean House famous shore dinner, Dr. Hugo Kosloff will talk on "Russia and America as I See Them."

No program is scheduled for Saturday but many are planning to spend the week-end at this fine resort.

### Scott Sets Date for Two-Day Meeting

CHESTER, Pa.—Members of all industrial sales divisions of Scott Paper Co. will gather for a two-day meeting on May 24 and 25. It will be the first national industrial sales convention since February of last year.

The meeting is being designed to give industrial men a complete picture of company operations. The first day will be spent in touring production departments and in discussion of key phases of the business. Personnel director A. J. Schroder, 2nd, will act as chairman, while the speakers' list includes: J. L. Ober, F. W. Brainerd, B. S. Garrett, C. W. Card, G. W. Pepper, L. C. Stevens, R. H. Rausch, H. M. Ostertag and F. W. Plowman. Executive vice-president R. C. Mateer will be guest speaker at a dinner following Monday evening's conference.

The hotel Barclay, Philadelphia, will be the scene of the meeting on May 25, when Walter Benson, Chicago Industrial divisional manager, will be chairman. New developments in the industrial sales picture and special participation on the part of the men will highlight the second half of the forthcoming meeting.

## TAPPI Plans For Plastics Conference

NEW YORK—The Plastics Committee of the Technical Association of the Pulp and Paper Industry will sponsor a two-day conference at the Institute of Paper Chemistry, Appleton, Wisconsin on August 16-17, 1948.

The program on the 16th will be devoted to a symposium on the nature of the adhesion of resins to cellulose and will be under the direction of Professor Herman Mark of the Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

The meeting of the 17th will be devoted to a discussion of plastic coating of paper under the chairmanship of R. H. Mosher of the Marvellum Company, Holyoke, Mass.

This meeting which will be under the general chairmanship of Professor Edwin C. Jahn of the New York State College of Forestry, Syracuse, N. Y.

The Plastics Conference will immediately precede the Fundamental Research Conference on the Physical Nature of the Components of Wood to be held at Madison, Wisconsin on August 18-20, 1948. The two conferences are being held consecutively in Wisconsin as a convenience to the large number of industry and university men who will be interested in attending both meetings.

The Conway Hotel, Appleton, Wis. has indicated that it can accommodate about 100 people for the nights of August 15-16. Reservations should be made now with the hotel. The Appleton Hotel in Appleton, the Menasha Hotel in Menasha and the Valley Inn at Neenah can also accommodate a number of people who make reservations in time.

### Walker-Goulard-Plehn Opens Washington Office

NEW YORK—Walker-Goulard Plehn Company, one of the larger printing converting and industrial paper distributors, recently celebrated the official opening of its new office in the Ring Building, 1200 Eighteenth Street, Washington, D. C. This office, under the direction of John E. Walsh, primarily will handle the company's Government business. The home office at 450 Pearl Street, New York, will continue to handle all regular business on printing papers, paper board, carbonizing tissue, lamp shade and saturating papers.

## Conservation Group To Visit Duke Forest

DURHAM, N. C. — The Southern Pulpwood Conservation Association's summer field meeting will be held June 22 and 23 in this city.

The meeting will open Tuesday, June 22, with a dinner at the Washington Duke hotel. Ray F. Weston, Chief Forester of Hollingsworth & Whitney, Mobile, Alabama, and president of the Association, will preside. The evening discussion will include a history of the Duke Forest, discussion of cooperative marketing of forest products, and a plan of foresters-in-training in industry, all conducted by members of the faculty of the School of Forestry, Duke University.

The meeting will continue on Wednesday with an inspection of the Duke Forest. Some of the experiments on the Forest are fifteen years old, and reliable information is now available from this research. The work which will be inspected deals primarily with different methods of thinning, harvest cuts for establishment of reproduction, hardwood control, and volume of wood secured from different spacings in plantations.

A feature of the field trip, following luncheon in the woods, will be a demonstration of a method of determining the wood growing capacity of forest lands through soil analysis.

## Blank Book Raises Pay Rate 5 Percent

HOLYOKE, Mass. — National Blank Book Company has given its employes a five percent across-the-board pay raise, that will mean more than $100,000 in additional payroll funds here.

The 850 members of the International Brotherhood of Bookbinders, AFL, who had originally been asking for a 15 percent pay boost, accepted the company's offer of five percent. The company also agreed to make upward adjustments in some categories of work where it believes its rates are below the skill required for the job.

This pay raise will necessitate an increase in prices in some lines, Richard P. Towne, treasurer of National Blank Book, said following announcement of the increase. Because of the highly competitive condition in the blank book and school supply lines, present prices will be kept. But in the commercial loose leaf field, prices will be increased to help management absorb some of the $100,000 added to its payroll.

Towne said that there is some room left in this particular field because of the price rise of its major competitor, instituted on February 15. Since then, there has been a variance of prices that has favored National Blank Book, and has resulted in a higher demand for its products. Now National Blank Book will be on even price terms with its principal competitor.

# FINANCE

## Canada Court Rules On Promise to Pay

TORONTO, Ont. — The "Abitibi" amendment to the Income War Tax Act of 1947 was justified, according to a judgment of Mr. Justice Angers of the Exchequer Court in the case of Flinn *v.* The Minister of National Revenue, rendered April 27, at Halifax.

It will be recalled that the bonds of the reorganized Abitibi company were partly on account of the principal and partly on account of the arrears of interest on the original bonds. The Tax Division, by a ruling which appeared on the face of the bonds, declared that the part of the value representing unpaid interest on the original bonds would be treated as income in the hands of the holders at redemption. This had obvious disadvantages and the amendment of 1947 provided that a security or other right received on or after January 1, 1947, in lieu of interest or declared dividends was income in the year in which it was received notwithstanding that there was no actual payment of the money.

The 1947 amendment reversed the law as laid down in cases decided in England, but there was, at the time, no Canadian court decision on the point.

In the case just recently decided, the taxpayer had received from United Service Corp. Ltd. "dividend notes" to the face amount of dividends on the cumulative preferred stock of the company which had been passed in the 4½ years preceding 1936. These "dividend notes" were not payable until 1964. The dividends in respect of which these notes were given were declared in December, 1944, and the notes were dated as of that time.

Mr. Justice Angers held that a promise to pay is not the same as payment and that dividends (under the law as it stood prior to 1947) were not taxable until they were actually paid. He accordingly relieved the taxpayer from paying the tax which had been assessed on the basis that the "dividend notes" were income to the amount of their face value when given to the shareholder in 1944.

The judgment serves to remove any doubts there may have been regarding the state of the law before 1947. A point of interest is that the taxpayer apparently attempted to argue that the settled practice of the Minister had not been "to treat the receipt of evidence of indebtedness as receipt of the indebtedness itself." As the decision ruled against the Minister on the law, there was no occasion to discuss whether the settled practice created any rights on which a taxpayer could rely in a court of law.

A similar argument, however, received consideration in the recent case of The King *v.* Central Manufacturers' Mutual Insurance Company. In that case, it appeared that the Superintendent of Insurance in the course of determining "net premiums" had allowed the taxpayer to claim a deduction under the heading "Rebates and Return Premiums" for the years 1932 to 1943. In the year 1944 the taxpayer was refused this deduction and Mr. Justice Cameron held that the Crown was not prevented from recovering the increased tax which thereby became payable because the previous existing practice, now found to be erroneous, had been to allow the deduction.

## Union Bag Sales Expected To Reach $75 Million

NEW YORK — Union Bag & Paper Corporation's sales volume for this year is expected to reach $75 million, as compared with $63,511,527 in 1947, Alexander Calder, president, declared at the annual banquet of the company's Quarter Century Club at Hotel Waldorf-Astoria Wednesday night. The increase has been made possible by addition of a fifth paper machine in the company's Savannah, Ga., plant, expansion of its paper bag factories there, and erection of a modern paper box plant.

The company also expanded production this year with purchase of the Trenton, N. J., Container Company, and Corrugated Containers, Inc., in Chicago. In Jamestown, N. C., it has acquired an interest in Highland Container Company.

In spite of the present favorable sales outlook, Mr. Calder warned his listeners "not to think that this sellers' market will continue forever," and said that many reports from the "grass roots" indicate a falling off in business, a weakening of prices, cancellation of orders, and considerable unemployment.

## Coleman Joins McCabe In Federal Reserve Post

CHESTER, Pa.—Philip E. Coleman, publicity manager for Scott Paper Co. since August last year, has been granted a leave of absence to act as an assistant to Scott president, Thomas I. McCabe, recently named chairman of the Federal Reserve Board.

In his new capacity, Mr. Coleman will be located in Washington, D. C., with headquarters in the Federal Reserve Building. He will work closely with Mr. McCabe.

## FINANCIAL RECORD OF THE WEEK

### New York Stock Exchange

High. Low and Last for Week Ending May 8, 1948

STOCKS

| | High | Low | Last |
|---|---|---|---|
| A. P. W. | 6 | 5⅜ | 5⅞ |
| Armstrong Cork Co. | 52⅛ | 50½ | 51¾ |
| Armstrong Cork Co., pf. 4 pf. 4 | 112¼ | 110½ | 111¼ |
| Armstrong Cork Co., pf. 3¾ | 96⅝ | 95⅜ | 96 |
| Celotex Corp. | 28½ | 27¼ | 27⅝ |
| Celotex Corp., pf. | 19 | 18½ | 18¾ |
| Certain-Teed Products Corp. | 16½ | 15¾ | 16⅜ |
| Certain-Teed Products Corp., pf. | .... | .... | .... |
| Champion Paper & Fibre Co. | 23⅜ | 22⅜ | 22¾ |
| Champion Paper & Fibre Co., pf. | .... | .... | .... |
| Congoleum Nairn Co. | 32¼ | 31½ | 31½ |
| Container Corp. of America | 39¼ | 37¾ | 38⅝ |
| Container Corp. of America, pf. | 98 | 97¼ | 98 |
| Crown Zellerbach Co. | 31¾ | 30¼ | 31⅝ |
| Crown Zellerbach Co., pf. 4.20 | 100 | 98 | 99⅞ |
| Crown Zellerbach Co., 4 pf. 4 | 118½ | 113¼ | 118½ |
| Dixie Cup Co. | 37½ | 37½ | 37½ |
| Dixie Cup Co., A | 52½ | 51½ | 52½ |
| Flintkote Co. | 37⅛ | 36⅜ | 36⅞ |
| Flintkote Co., pf. | 99½ | 99 | 99 |
| Robert Gair | 8⅝ | 8¼ | 8¼ |
| Robert Gair, pf. | 19½ | 19⅜ | 19½ |
| International Paper Co. | 59½ | 55 | 59 |
| International Paper Co., pf. | 97 | 96 | 97 |
| Johns-Manville Corp. | 39 | 37½ | 38½ |
| Johns-Manville Corp., pf. | 109 | 109 | 109 |
| Kimberly-Clark Corp. | 21½ | 20⅝ | 20¾ |
| Kimberly-Clark Corp., pf. | 101¼ | 100 | 100 |
| Mac Andrews & Forbes | 37¼ | 37 | 37 |
| Mac Andrews & Forbes, pf. | .... | .... | .... |
| Marathon Corp. | 22¾ | 20½ | 22¼ |
| Mead Corp. | 21¼ | 19¾ | 20½ |
| Mead Corp., pf. 4¼ | 91½ | 90 | 91½ |
| Mead Corp., pf. 2 | 43 | 42 | 43 |
| National Container Corp. | 13¼ | 12⅝ | 12⅞ |
| Paraffine Companies, Inc. | 25⅜ | 24¼ | 25 |
| Paraffine Companies, Inc., pf. | 102½ | 101 | 101¼ |
| Rayonier, Inc. | 30¾ | 27¾ | 30⅛ |
| Rayonier, Inc., pf. | 33½ | 33½ | 33½ |
| Ruberoid Co. | 65 | 61⅝ | 64 |
| St. Regis Paper Co. | 11⅜ | 10¾ | 10⅞ |
| St. Regis Paper Co., pf. | 88½ | 86½ | 88½ |
| Scott Paper Co. | 46½ | 45½ | 46 |
| Scott Paper Co., pf. | 93½ | 92¾ | 93½ |
| Sutherland Paper Co. | 42 | 40 | 40⅝ |
| Union Bag & Paper Corp. | 36⅜ | 34¼ | 36 |
| United Board & Carton | 13¼ | 12½ | 13 |
| U. S. Gypsum Co. | 101 | 99½ | 101 |
| U. S. Gypsum Co., pf. | 177½ | 177 | 177½ |
| United Wallpaper | 5¼ | 5 | 5⅛ |
| United Wallpaper, pf. | .... | .... | .... |
| West Virginia Pulp & Paper Co. | 46½ | 44½ | 46½ |
| West Virginia Pulp & Paper Co., pf. | 105 | 105 | 105 |

BONDS

| | | | |
|---|---|---|---|
| Celotex Corp., 3½s '60 | 100 | 100 | 100 |
| Certain-Teed Products Corp., 5½s '53 | .... | .... | .... |
| Champion Paper & Fibre Co., 3s '65 | 99 | 99 | 99 |

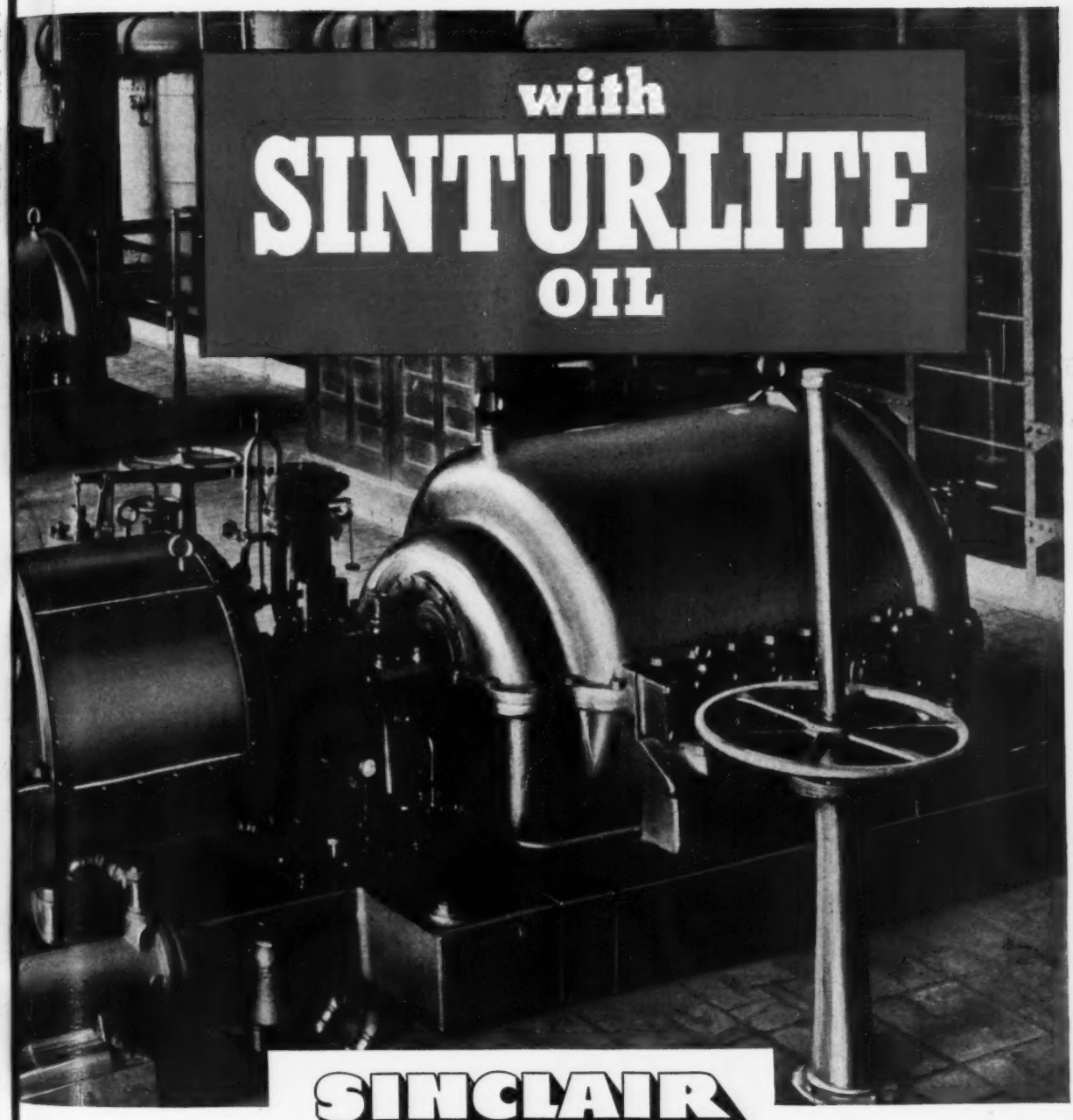
### New York Curb Exchange

High. Low and Last for Week Ending May 8, 1948

STOCKS

| | High | Low | Last |
|---|---|---|---|
| American Writing Paper Corp. | 7 | 6½ | 6⅞ |
| Great Northern Paper Co. | 42½ | 40½ | 42½ |
| Taggart Corp. | 11¼ | 11 | 11¼ |

# ..and STAY RIGHT

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## Ferguson Continues One-Contract Method

NEW YORK — The H. K. Ferguson Company, internationally known industrial engineers and builders and pioneers in the "one contract" method of construction, will continue to emphasize its ability to design, as well as build and equip, industrial production and distribution facilities of all types, Otto F. Sieder, executive vice-president and general manager, declared last week in a statement of policy distributed to employees and clients.

"Our engineering staff has been expanded to the point where we are able to engineer almost any kind of industrial plant," Mr. Sieder said. "In recent years especially, we have been constantly adding to our process engineering department and we now have an organization that can undertake the design of all kinds of chemical processing plants, both in this country and abroad."

The Ferguson company was one of the first engineering and building concerns which sold its services on the basis of a "complete industrial service," including design, construction and installation of processing equipment. The principal advantages of this method of industrial expansion are that it fixes definite responsibility, it is quicker and it is more economical.

Mr. Sieder, who became general manager of the Ferguson company in 1945, disclosed that the firm now has a staff of 700 engineers and draftsmen working in four district offices in Cleveland, New York, Houston and Cincinnati. In addition, the firm employs more than 9000 field construction workers on job sites from Canada to Corpus Christi and from the Atlantic to the Pacific coasts. Other supervisory construction personnel are currently working in South America and India.

In his policy statement, Mr. Sieder explained that a primary reason for expanding the process engineering department is that the chemical industry offers one of the best sources of new business in the years ahead. This field, according to Mr. Sieder, offers a steady and almost permanent market for competent engineering and building services. The reason is based on the obsolescence and replacement conditions in the chemical and other process industries.

Mr. Sieder said that a progressive engineering department must remain abreast of every technological development affecting design programs.

"We believe," he continued, "that our supervisory construction forces, with the cooperation of labor, should exert every effort to increase productivity of the individual craftsman. We believe our purchasing department, in representing the best interests of our clients, should shop for price as long as it is consistent with quality and delivery desired."

Mr. Sieder told employees and clients that the Ferguson company is dedicated to a policy of maintaining good customer relations—an absolute necessity for survival since 90 percent of the firm's business represents "repeat orders." But good customer relations, he warned, should never be sought at the expense of sound engineering and construction.

"As a service organization with a counsel-client relationship on industrial expansion programs," he said, "we feel that wise, honest counsel today will bring us trusting clientele in the future."

## Pennsalt Shareholders Grant $10,000,000 Loan Authority

PHILADELPHIA—Shareholders of the Pennsylvania Salt Manufacturing Company at their annual meeting authorized the company to raise additional funds through loans to a maximum of $10 million.

Company officials said that only a long-term loan of $3 million to help finance expansion and improvement of the company's facilities, is being considered at the present time. Pennsalt's expansion plans include construction of a new plant at Calvert City, Ky.

At the same meeting, held in the company's offices, three members of the board of directors were re-elected for terms expiring in 1951. They are Francis Boyer, executive vice-president of Smith, Kline & French Laboratories; Charles B. Grace, vice-president and treasurer of Heintz Manufacturing Company; and Y. F. Hardcastle, Pennsalt vice-president in charge of manufacturing.

## Pulp & Paper Trading To Sell Monadnock Paper

BENNINGTON, N. H. — Monadnock Paper Mills, Inc., the new company formed here to operate the local paper mill, has appointed the Pulp & Paper Trading Company, 21 East 40th St., N.Y.C., as sales agents. Gilbert Verney, well-known textile manufacturer and president of Verney Corporation, Boston, heads the Monadnock Paper Mills, Inc., as president. Frank Bryant is treasurer and John R. McLane, Jr., secretary.

Since 1835, fine rag and high grade bleached papers have been manufactured on this mill site. The mill has two Fourdrinier machines, only one of which has been operating over the past several years. The second machine is being made ready and both will be remodeled to make this one of the most up-to-date fine paper mills. A complete line of advertised mill brand papers for the paper merchant will be featured.

## Taggart Pays 15 Cents

NEW YORK — Directors of Taggart Corporation have declared a dividend of 15 cents a share on the common stock payable June 1 to stockholders of record May 14.

## Smith Does Research On Condenser Paper

LEE, Mass. — A cooperative agreement to further the development and production of metallized condenser paper has been signed by Smith Paper, Inc., and the National Research Corporation, of Cambridge, according to a statement issued recently by W. F. Tatum, vice-president and general manager of Smith Paper.

This metallized paper, when it reaches full production, is expected to revolutionize the present-day paper capacitor industry, according to the Smith Paper research department.

The process of coating condenser tissue with an extremely thin layer of metal was originally developed in Germany during the war. It was used in the manufacture of small paper capacitors employed in precise, electronic control equipment.

Research on this development has been carried on in the United States for the past seven years. It is believed by research men working on this project, that a machine has been developed which will far surpass the German process in efficiency and production.

At present, paper capacitors are composed of layers of aluminum foil separated by thin layers of kraft paper insulation. Metalized paper, as jointly developed by Smith Paper and National Research, will combine the functions of the regular condenser paper and the aluminum foil in one operation.

The advantages obtained in the use of metalized paper are the possible design of much smaller capacitors with the same rating, the use of equipment to wind capacitors and a property of self-healing which allows metalized paper capacitors to continue to operate in spite of short circuits or breakdowns which may occur in the capacitor system.

The task of completing the development and putting metalized paper into full production has been given to Dr. P. A. Forni of the Smith Paper research department.

## Neun Box Plant Will Move to New Quarters

ROCHESTER, N. Y.—H. P. Neun Company, manufacturer of corrugated folding and setup boxes, plans to move to the former Certo plant in Fairport, N. Y., as soon as alterations are completed, John H. Neun, vice-president and general manager, declared this week. The company's offer of $35,000 for the property has been accepted, he said.

Owned by the General Foods Corporation since 1929, the Fairport plant includes 10 buildings with a siding on the main line of the New York Central Railroad and is assessed at $145,000.

Lease of the Neun Company on its present plant at 415 Culver Rd. expires June 30 and the Fairport location will provide needed space for expansion, Neun said.

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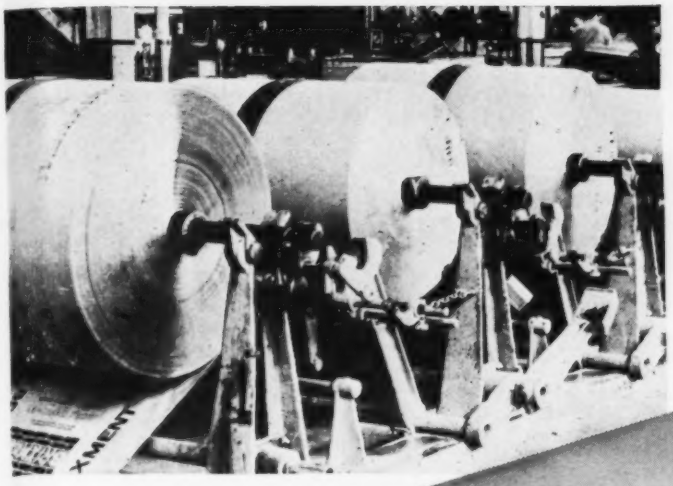

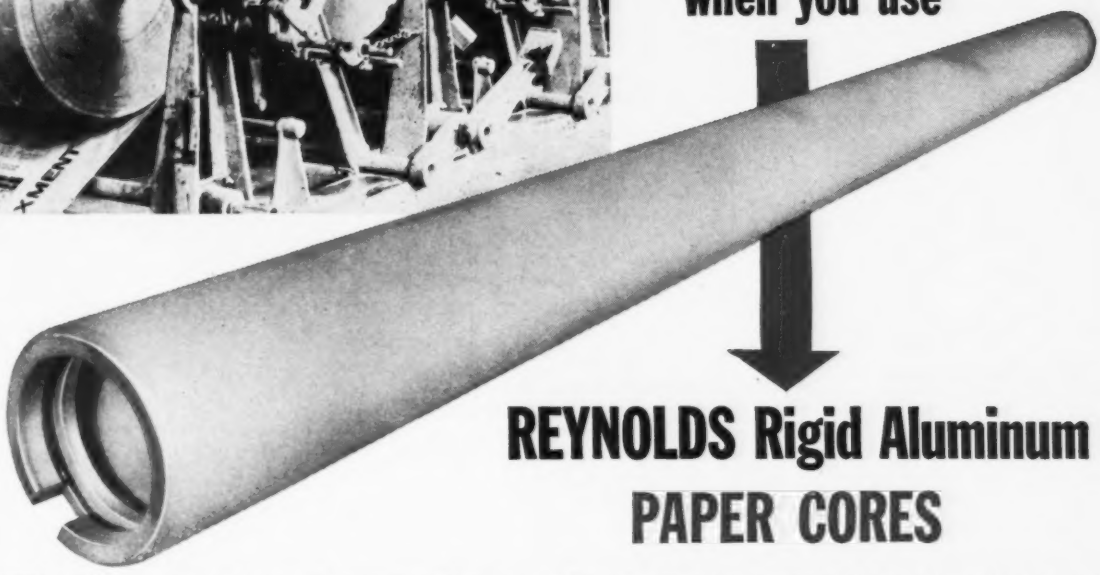

## REYNOLDS Rigid Aluminum PAPER CORES

PAPER rolling to your plant and paper rolling in your plant makes a big handling and shipping cost item. But there's a way to slice that cost. Find out how lightweight, strong and durable aluminum can serve you. Reynolds Rigid Aluminum Paper Core stock makes a paper core that is lighter by far, actually makes workmen happy when they lift it; stronger too, because this tough heat treated alloy is engineered for the job.

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# TRENDS

Office of the PAPER TRADE JOURNAL, Wednesday, May 12, 1948.

Responding to the request of Representative Clarence J. Brown, chairman of the Select Committee on Newsprint and Paper Supply, for an investigation into the proposed use of funds of the Economic Cooperation Administration for the purchase of 288,000 tons of newsprint for Britain and Eire during the next fifteen months, such supplies to come from Canada and Newfoundland. Administrator Paul G. Hoffman stated that he has endeavored to obtain a full and complete report on the United Kingdom's proposed newsprint imports.

According to official information, the United Kingdom estimates its requirements of newsprint from Canada and Newfoundland for the fiscal year of July 1, 1948-49, to be 148,000 short tons, an estimated increase of approximately 33,000 tons over actual imports from these sources in each of the last two calendar years. These quantities the United Kingdom expects to get under a ten-year contract with producers in Canada and Newfoundland which was signed in August, 1946, and revised last July because of Britain's dollar shortage. Under the revision, scheduled imports from Canada and Newfoundland for the calendar year 1948 were reduced 112,000 tons.

It is indicated that the United Kingdom's current newsprint consumption of 8,000 tons a week is not to be increased but that steps are being taken to rebuild stocks which have declined steadily since August of 1946, a decline which probably will be sustained in view of the lowered production of Scandinavian mechanical pulp as a result of the extreme dry spell of last year. It is estimated that by June 30 stocks will be down to less than ten weeks' requirements.

Administrator Hoffman also made public figures on Canadian newsprint obtained from official Canadian sources. Newsprint production in Canada and Newfoundland for 1948 is expected to reach 4,875,000 tons, of which 285,000 tons will be consumed in Canada. (During the year 1947, Canada and Newfoundland shipped 3,828,909 tons to the U. S.)

Leading questions within the trade are: If 1,500,000 tons of European newsprint machine capacity is standing idle because of lack of raw materials and minor repairs, why not use E.C.A. dollars to get these back into production; and why buy newsprint away from U.S. publishers at the European market price of $180 per ton when Canada's price to the United States market is $96?

### Waste Paper

Collections continue to exceed those of a year ago. For the first 18 weeks of the year, collections were 2.8 percent better than during the same weeks of 1947. Supplies of folded news and mixed paper are reported to be well above demand with some dealers disposed to accept lower than quoted prices to keep stocks moving. Old corrugated continues to enjoy steady movement.

Consumption likewise is higher than a year ago with sustained buying of quality packed paper of all grades reported. Emphasis on quality pack gains in momentum. One upstate New York paper manufacturer wrote his complaint to the Eastern Conservation Committee saying that the quality of waste paper his mill receives — which is particularly the high grades such as soft white shavings, white news cuttings, manila envelope cuttings, et cetera — is poorly graded and packed, and that several shipments have had to be rejected or returned in part. The E.C.C. reports that reports from consumers of bulky grades indicate a general improvement in pack but that there seems to be a diversity of opinion by mill buyers on the quality of the pack of the higher grades.

### Casein

Output of dry casein in March was 980,000 pounds, 62 percent below that of a year ago, and the second lowest for that month in 25 years, according to a report from the Bureau of Agricultural Economics.

Production for the first quarter of the year was 2,540 million pounds, compared with 7,387 million pounds for the same period of 1947.

Manufacturers' holdings on March 31 were reported as approximately 1,645 million pounds, the lowest inventory since the records were established in 1942. Holdings for the same date in 1947 were 2,650 million pounds.

Imports from the Argentine during March were reported as 481,000 tons of dry casein.

### Rosin

Surprising news to naval stores interests came with the publication last week of the export bulletin which listed those articles freed from the necessity of export licenses, also those permitted for export to Iron Curtain countries. Rosin and turpentine were not included in those lists.

Reaction to this exclusion came quickly in the naval stores industry so that an important commitment went immediately to Washington to try to have rosin and turpentine placed on a supplementary list as early as possible, since it is felt in the industry that inclusion of these items would settle many of the problems now being confronted.

Although naval stores total 1948-49 yield is expected to exceed 1947-48's by at least 10 to 15 percent, it has been anticipated that the demand would be far in excess of the supply and that naval stores would be in a tight position after E.C.A. dollars had made the market available to European consumers. Exports of gum rosin for the year 1947 amounted to 190,399,758 pounds, and of wood rosin 165,391,404 pounds.

### China Clay

Forty percent of the 625,000 tons of English clay produced in 1947 was exported; 83,000 tons of which went to the United States and 27,000 tons to other hardest currency countries such as Canada and the Argentine. Another 87,500 tons went to Belgium, Switzerland and Sweden.

Great possibilities exist for increasing exports to North America this year, the *World Paper Trade Review* reports, and especially to the United States. The target to which the British industry is working conscientiously is an increase to the U.S. this year to make the total 275,000 tons. During the 1920's, the Cornish industry held about 60 percent of the U.S. market in paper clays, whereas it now is less than 10 percent. British industry is called to an all-out effort to regain this market.

### Titanium

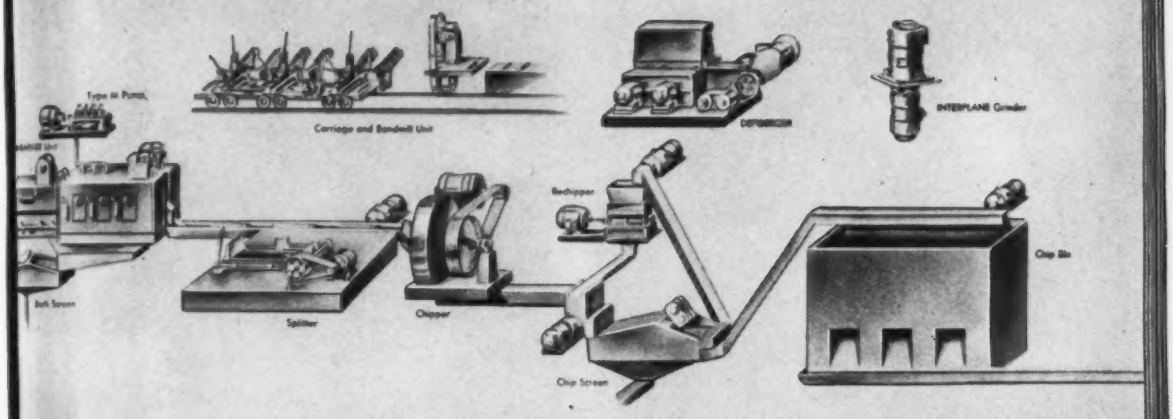
Investigation of the extensive easily minable inland deposit of titanium minerals discovered along the Florida coast by the Bureau of Mines in 1946 and 1947 has revealed the arizonite variety of ilmenite, as well as other heavy minerals such as zircon, monazite, kyanite, sillimanite and small amounts of many others. From these substances which yield the whitest of paint pigments, a light metal twice as strong as mild steel and as corrosion-resistant as stainless steel is being produced by a method developed by the Bureau, it was revealed by the Bureau's director.

While titanium is one of the most readily available metals that could be used for structural purposes, its usefulness was limited because in the form in which it was available it was brittle and so hard that it would cut glass. New fields of usefulness have been opened up by development of a method for producing ductile titanium which can be drawn into wire and rolled into thin sheets. The Bureau is cooperating with industry in exploring these new fields.

Report of the investigation is contained in a free publication entitled "Report of Investigations 4208, Titanium Minerals in Trail Ridge, Florida," by Robert V. Spencer, Bureau mining engineer. Requests for the publication should be addressed to the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa., and should identify the report by number and title.

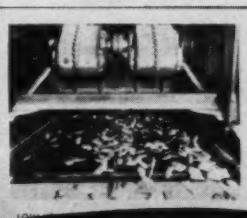
# & Paper Book

## Chalmers Search for Better Woodroom Machinery



SUPPLYING WATER for the three Streambarker units is this four stage centrifugal pump delivering 600 gpm at 650 ft. head. The Allis-Chalmers motor supplies 100 hp at 1500 rpm.

HERE'S STREAMBARKER IN OPERATION—making gains in product quality—reducing [illegible] losses—producing from 8 to 12 [illegible] in mills throughout [illegible] reduced [illegible]



[illegible] INTO TWO HOPPERS of this *Defibrator*, [illegible] reduced to fiber at a power cost [illegible], and that's low cost [illegible] For sure, constant [illegible] throughout.

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**Milwaukee 1, Wisconsin**

Please send me, without obligation, new Bulletin 25B6827, "Forest to Finished Product," containing complete model flow sheets of pulp and paper processes.

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This is the latest record of EBASCO engineers on a complete paper machine installation. For a southwestern paper mill, they did the complete job through their teamwork of engineering and installation.

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Systems & Methods · Taxes · Traffic

## Noble Joins Morart As General Manager

HOLYOKE, Mass. — Walter Noble of Detroit, Mich., has assumed his duties here as general manager and technical director of the Morart Gravure Corporation. Charles P. Moriarty, president of Morart, has been general manager and president, but recently he has extended his interests and is turning over the plant managership to Noble.

Noble comes to Morart from the Fabricon Products, Inc., of Detroit, where he has been since 1936. He is a graduate of Wayne University in Detroit, where he majored in chemistry.

In 1942, he started the plastics division of Fabricon, Inc. He has had extensive experience with phenolic, melamine, polyester and urea resins on paper, fiberglas, fabrics and mats including industrial and decorative grades. He has supervised the installation of extrusion units for the production of polythene sheeting.

Noble is a member of the American Chemical Society, the Society of Plastics Engineers, and the Reinforced Plastics Division of the Society of the Plastics Industry.

# OBITUARY

## Thomas Luke Passes —W. Va.'s Chairman

*(Continued from page 7)*

The industrial birth of the company came in 1888, when the Piedmont Pulp & Paper Co. was formed and a sulphite pulp plant was built across the Potomac River from Piedmont, W. Va. The site of the original mill later became the incorporated town of Luke, Md. The small mill employed 60 persons and produced about 18,000 tons of pulp annually.

Today the company operates six highly integrated pulp and paper plants at Luke, Md.; Covington, Va.; Williamsburg and Tyrone, Pa.; Mechanicville, N. Y.; and Charleston, S. C., and employs about 8,600 persons. It owns more than 400,000 acres of woodlands and produces more than 800,000 tons of paper and paper board annually, as well as a significant amount of chemical products. It is owned by about 4,000 stockholders.

In the days of the company's early expansion Mr. Luke gained a reputation as an astute and capable operating man. For six years following construction of the Covington plant in 1899, Mr. Luke directed its activities as manager. Today the plant is the largest operated by the company. Between 1905 and 1909 he managed company plants at Luke and Mechanicville, where he developed many progressive operating techniques widely accepted in the paper industry.

Mr. Luke moved to the company's New York offices in 1909 and three years later was elected vice-president, a position he held until 1934. Following the death of his brother, David Lincoln Luke, in 1934, Mr. Luke was elected president. Under Thomas Luke's leadership the West Virginia Pulp & Paper Co. continued to expand, developing its operations in the South, where it had acquired tracts of pine woodlands, and building in 1937 a modern kraft pulp and paper mill at Charleston, S. C.

Mr. Luke directed the company until he reached retirement age in 1945, when he turned over the reins to his nephew, David L. Luke, Jr. Upon his retirement from active management, Mr. Luke not only waived his rights to a pension but also agreed to serve as chairman of the board of directors, without salary. In this capacity he took an active interest in the company's affairs, going to his office regularly until illness forced him to abandon his business routine.

Mr. Luke was born August 26, 1870, in Rockland, Del., the son of William Luke and Rosa Thompson Lindsay Luke. He was educated at Rugby Academy, Wilmington, Del., and the University of Pennsylvania, where he was graduated in 1892 with a B.S. degree.

Mr. Luke married the former Miss Bessie Stirling of Wilmington, in 1895. Mrs. Luke died on September 11, 1947. Mr. and Mrs. Luke had resided for a number of years in North Tarrytown, N. Y. During the past several months, Mr. Luke lived at the Barclay Hotel in New York City.

Mr. Luke was a member of the Union League Club, Uptown Club, U.S. Seniors Golf Club of New York City, Sleepy Hollow Country Club, Scarborough-on-Hudson, N. Y.; Mechanicville Golf Club, Mechanicville, N. Y.; and the Devon Club, Luke, Md.

Mr. Luke is survived by one son, Donald K. Luke of Irvington, New York, and four daughters, Mrs. H. Freeman Matthews of Washington, D. C.; Mrs. Henry T. Burns of New York City; Mrs. Parker Wilson of Irvington, New York, and Mrs. John C. Graham of Bedford Village, New York; one brother, Adam K. Luke; and twenty-two grandchildren.

## Samuel McCoubrey

CARDIFF, Wales — Long connected with Canadian pulp and paper interests, Samuel G. McCoubrey, 77, died here May 4. While in Canada he was associated with Abitibi Power and Paper Company and the Wayagamack Paper Company. He is survived by his widow, Jenny; two daughters, Mrs. Francis C. Norton of Winchester, Mass., and Mrs. Alden F. Shum of Ogunquit, Maine; and one son, David McCoubrey of Winchester, Mass.

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If you visit Moore & White—and we wish that you would—you'll find that our plant-capacity has recently been *doubled*. Even more important to you as a paper-maker, something significant has been added to the personal equation.

A sustained upsurge in orders made this expansion imperative. Reinforcements of machinery and brains—experienced key men to round out a hard-hitting team—just had to be added to cope with present production-demands and anticipated business. In drafting room, shop, and field, we're now set up better than ever to give you expert counsel and painstaking service in every aspect of your paper-making operations.

Competition gives no quarter; the faltering performance of ageing equipment cannot be tolerated. Moore & White will get at the heart of your production-problems . . . rebuild your laggard machines to deliver the greatly increased tonnage demanded by today's high break-even point.

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*CUSTOM-BUILT MACHINES FOR MAKERS OF PAPER AND PAPERBOARD*

# PRICES

The quotations given below are indicative of trends in an open market. At the moment they can be of little more value for while some volume business still is being done under contract at the figures given below, fluctuations representing special conditions are too varied and too frequent to permit prices to be given as representing a wholly stabilized market.

## Paper

(Delivered New York)

Standard News, per ton—
Rolls, contract .... $93.00/$96.00
Sheets ..... 108.00/109.00

Kraft—per cwt.—Carload Quantities Zone A Deld. 40 lb. base wgt.

| | | |
|---|---|---|
| Superstandard Wrapping ..... | $9.00/ | — |
| No. 1 Wrapping .... | 7.25/ | 8.00 |
| Standard Wrapping .. | 6.50/ | — |
| Standard Bag ..... | 6.50/ | — |

Tissues—Per Ream 24x36 (480) 11 lb. Zone 1.

| | | |
|---|---|---|
| Wh. No. 1 Frd. .... | $1.84/ | $2.00 |
| Wh. No. 1 M. G. ... | 1.94/ | 2.00 |
| Wh. No. 1½ ..... | 1.60/ | — |
| Wh. No. 2 ..... | 1.75/ | — |
| Kraft Anti-Tar ..... | 1.65/ | — |
| Kraft Unbl. ..... | 1.85/ | — |
| Manila No. 2 ..... | 1.62/ | — |
| Shred. Wh. No. 1 cwt. | 1.10/ | 1.50 |

Toilet—Per Case of 100 rolls—1 M Sheets.

| | | |
|---|---|---|
| Unbleached ..... | $8.50/ | $10.00 |
| Bleached ..... | 8.50/ | 10.00 |

Paper Towels—Per Case of 3750—Zone 1.

| | | |
|---|---|---|
| Wh. Jr. M'tif'd 9¼x9½ .. | $5.15 | |
| Br. Sr. M'tif'd 10x12 .... | 3.60 | |
| Br. Jr. M'tif'd 9½x9¾ ... | 3.10 | |
| Br. Jr. Sgl. fold 10x10¾ .. | 3.15 | |

Manila—per cwt.—C-l. f.a.

| | | |
|---|---|---|
| No. 1 Jute Tag ... | $14.50/ | — |
| Reg. Jute Manila . | 13.25/ | $15.50 |
| No. 1 Manila .... | 9.75/ | — |
| 5 lb. Manila ..... | 10.75/ | 11.25 |

Boards, per ton—

| | | |
|---|---|---|
| Plain News ..... | $92.50/ | — |
| Filled News ..... | 94.00/ | — |
| Plain Chip ..... | 90.00/ | — |
| Sgl. Mla. L-d. Chip* | 100.00/ | 102.50 |
| White Pat. coated* | 120.00/ | — |
| Kraft Liners 42 lb. | 100.00/ | — |
| Kraft Corr. .009 .. | 105.00/ | — |
| Binders Boards ... | 126.00/ | — |

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—White, 16 lb.

Bonds, per cwt.

| | Carton | 4 C't'n | Ton |
|---|---|---|---|
| 100% Rag Ext. | | | |
| No. 1 .... | $55.00 | $50.80 | $48.70 |
| 100% Rag ... | 48.25 | 44.55 | 42.70 |
| 75% Rag .... | 37.50 | 34.55 | 33.10 |
| 50% Rag .... | 32.25 | 29.40 | 28.25 |
| 25% Rag .... | 28.75 | 26.15 | 25.10 |

Ledgers, per cwt.

| | | | |
|---|---|---|---|
| 100% Rag Ext. | | | |
| No. 1 .... | $55.00 | $50.80 | $48.70 |
| 100% Rag ... | 48.25 | 44.55 | 42.70 |
| 75% Rag .... | 37.50 | 34.55 | 33.10 |
| 50% Rag .... | 32.25 | 29.40 | 28.25 |
| 25% Rag .... | 28.75 | 26.15 | 25.10 |

Sulphite Bonds and Ledgers—White, 16 lbs.

Bonds, per cwt.

| | | | |
|---|---|---|---|
| No. 1 ..... | $21.25 | $19.25 | $18.50 |
| No. 2 ..... | 20.25 | 18.30 | 17.55 |
| No. 4 ..... | 19.25 | 17.55 | 16.85 |

Ledgers, per cwt.

| | | | |
|---|---|---|---|
| No. 1 ..... | $21.75 | $19.65 | $18.85 |
| No. 2 ..... | 20.75 | 18.75 | 18.05 |
| No. 4 ..... | 20.00 | 18.10 | 17.35 |

Free Sheet Book Papers—White, Cased Paper

| (Per cwt.) | Case | Ton |
|---|---|---|
| No. 1 Glossy Coated . | 20.40 | $19.50 |
| No. 2 Glossy Coated . | 19.15 | 18.30 |
| No. 3 Glossy Coated . | 18.40 | 17.60 |
| (Per cwt.) | Case | Ton |
| No. 1 Antique (Watermarked) ..... | $15.90 | $15.15 |
| No. 2 Offset ..... | 15.15 to 17.90 | 14.60 to 17.10 |
| A Grade E. F. ..... | 14.90 | 14.25 |
| A Grade S. & S. C. . | 15.40 | 14.65 |
| B Grade E. F. ..... | 13.90 | 13.30 |
| B Grade S. C. ..... | 14.40 | 13.70 |

## Wood Pulp

Domestic mill contract prices delievered with varying freight allowances.

| | Per Short ADT |
|---|---|
| Groundwood ..... | $80.00/$81.00 |
| Unbleached Sulphite . | 124.00/ — |
| Bleached Sulphite ... | 125.00/135.00 |
| Bleached Soda ..... | 130.00/ — |
| Bleached Sulphate ... | 175.00/185.00 |
| Unbleached Sulphate Northern ..... | 125.00/155.00 |
| Unbleached Sulphate Southern ..... | 130.00/145.00 |

### Canadian Quotations

Prices delivered with varying freight allowances unless otherwise specified:

| | Per Short ADT |
|---|---|
| Reg. No. Kraft ..... | 125.00/ — |
| Unbleached Sulphite . | 125.00/126.00 |
| Bleached Sulphite ... | 125.00/135.00 |
| Glassine Unbleached Sulphite (no freight allowance) ..... | 120.00/ — |
| Bleached Soda ..... | 130.00/ — |
| Groundwood ..... | 80.00/ 85.00 |
| Sideruns Pulping News | 80.00/ — |
| Hardwood and Specialty Grades ..... | Nominal |

### Swedish Quotations

On dock, Atlantic Ports

| | |
|---|---|
| Bleached Kraft ..... | 185.00/195.00 |
| Bleached Sulphite ... | 185.00/195.00 |
| Unbleached Sulphite . | 155.00/175.00 |
| Unbleached Kraft ... | 147.50/165.00 |

### Finnish Quotations

On dock, Atlantic Ports

| | Per Short ADT |
|---|---|
| Bleached Sulphite ... | $187.50/ — |
| Unbleached Sulphite . | 155.00/157.00 |
| Unbleached Sulphate | 147.50/ — |

## New Domestic Cotton Cuttings

(F.O.B. Shipping Point Plus Dealer's Commision)

| | |
|---|---|
| White Shirt ..... | $12.00/$12.50 |
| Unbleached Muslin ... | 12.00/ 12.50 |
| Light Silesias ..... | 9.00/ 9.25 |
| White Back Blue Overalls ..... | 9.00/ 9.50 |
| Blue Overalls ..... | 8.00/ 8.25 |
| Fancy Shirt ..... | 6.00/ 6.25 |
| Light Percales ..... | 8.50/ 8.75 |
| Light Prints ..... | 7.50/ 7.75 |
| No. 1 Washables ..... | 5.00/ 5.25 |
| Bleachable Khaki .... | 7.50/ 8.00 |
| Unbleachable Khaki .. | 6.50/ 7.00 |
| Cottonades ..... | 5.50/ 5.75 |

## Old Domestic Cotton Rags

(F.O.B. Shipping Point Plus Dealer's Commission)

| | Per 100 lbs. |
|---|---|
| No. 1 Whites Repacked | $5.50/ $6.00 |
| No. 1 Whites Miscellaneous ..... | 4.50/ 5.00 |
| No. 2 Whites Repacked | 3.50/ 3.75 |
| No. 2 Whites Miscellaneous ..... | 3.00/ 3.50 |
| Blue Overalls ..... | 3.75/ 4.00 |
| Thirds and Blues Repacked ..... | 3.25/ 3.50 |
| No. 1 Roofing Rags .. | 1.90/ 2.00 |
| No. 2 Roofing Rags .. | 1.75/ 1.85 |
| No. 3 Jute Bagging .. | 1.60/ 1.75 |
| No. 4 Brussels and hard back carpets .. | 1.65/ 1.75 |
| No. 5A Roofing Rags | 1.65/ 1.75 |

## New Foreign Cotton Cuttings

(Prices to Mill, F.O.B. Dock, N.Y.)

| | Per 100 lbs. |
|---|---|
| New Dark Cuttings .. | $5.50/ $5.75 |
| New Mixed Cuttings .. | 6.25/ 6.50 |
| Light Silesias ..... | 9.25/ 9.50 |
| Light Flanneletes .... | 9.25/ 9.50 |
| New White Cuttings .. | 12.00/ 13.00 |
| New Unbleached Cuttings ..... | 12.25/ 13.00 |
| Fancy Shirt Cuttings . | 6.50/ 7.00 |
| Light Prints ..... | 7.75/ 8.00 |
| Bleachable Khaki, No. 1 | 7.00/ 7.50 |
| Unbl. Khaki, No. 1 .. | 6.25/ 6.75 |

## Old Foreign Rags

(Prices to Mill, f.o.b. dock, N.Y.)

| | Per 100 lbs. |
|---|---|
| No. 1 White Linens .. | $14.00/$16.00 |
| No. 2 White Linens .. | 12.00/ 13.00 |
| No. 3 White Linens .. | 8.00/ 9.00 |
| No. 4 White Linens .. | 8.00/ 9.00 |
| No. 1 White Cottons .. | 8.00/ 10.00 |
| No. 2 White Cottons .. | 7.00/ 8.00 |
| No. 3 White Cottons .. | 6.00/ 6.50 |
| No. 4 White Cottons .. | 4.00/ 4.50 |
| Extra Light Prints ... | 6.50/ 7.00 |
| Old Light Prints ..... | 4.50/ 5.00 |
| Med. Light Prints .... | 3.75/ 4.25 |
| Dutch Blue Cottons ... | 5.25/ 5.50 |
| Checks and Blues .... | 4.00/ 4.25 |
| Linsey Garments ..... | 2.50/ 2.65 |
| Dark Cottons, European | 2.40/ 2.50 |
| Dark Cottons, Egyptian | 3.25/ 3.50 |
| Old Shopperies ..... | 2.20/ 2.30 |
| New Shopperies ..... | 2.40/ 2.50 |

## Bagging

(Prices to Mill, f.o.b. N.Y.)

| | Per 100 lbs. |
|---|---|
| Foreign Gunny, No. 1 | $6.50/ $7.00 |
| Domestic Gunny, No. 1 | 6.75/ 7.25 |
| Heavy Wool Tares ... | 6.25/ 6.50 |
| Heavy Wool Tares ... | 6.00/ 6.25 |
| No. 1 Scrap Bagging .. | 5.50/ 5.75 |
| Roofing Bagging .... | 1.75/ 2.00 |
| Foreign Manila Rope .. | 6.00/ 6.75 |
| Domestic Manila Rope | 6.50/ 6.75 |
| Jute Strings ..... | 5.00/ 5.25 |
| No. 1 Sisal Strings .. | 5.25/ 5.50 |
| Mixed Strings ..... | 1.75/ 2.50 |

## Waste Paper

Base Prices to Mills for Average Packings

(Dollars Per Ton)

F.o.b. New York, Baled

| | |
|---|---|
| No. 1 Hard White Envelope Cuts, one cut ..... | $155.00/$165.00 |
| No. 1 Hard White Envelope Cuts ... | 145.00/ 155.00 |
| No. 1 Hard White Shavings, unruled | 145.00/ 155.00 |
| No. 1 Hard White Shavings, ruled .. | 110.00/ 130.00 |
| Soft White Shavings, one cut ..... | 145.00/ 155.00 |
| No. 1 Soft White Shavings ..... | 135.00/ 145.00 |
| Soft White Shavings, Misc. ..... | 125.00/ 135.00 |
| No. 1 Fly Leaf Shavings ..... | 45.00/ — |
| No. 1 Groundwood Fly Leaf Shavings ... | 35.00/ — |
| N. 1 Heavy Books & Magazines ..... | 25.00/ 26.00 |
| Mixed Books ..... | 15.00/ 18.00 |
| No. 1 White Ledger | 75.00/ 80.00 |
| Manila Tab. Cards . | 95.00/ 100.00 |
| New Manila Envelope Cuttings, one cut . | 100.00/ 110.00 |
| New Manila Envelope Cuttings ..... | 65.00/ 75.00 |
| Extra Manilas ..... | 25.00/ 30.00 |
| Mixed Kraft, Env. & Rag Cuttings .... | 75.00/ 85.00 |
| Kraft Envelope Cuttings ..... | 110.00/ — |
| Triple Sorted, No. 1 Brown Soft Kraft | 65.00/ 75.00 |
| New Kraft Corrugated Cuttings ... | 70.00/ 75.00 |
| No. 1 Assorted Old Kraft ..... | 50.00/ 55.00 |
| New Jute Corrugated Cuttings ..... | 27.00/ — |
| Old 100% Kraft Corrugated Containers | 35.00/ 40.00 |
| No. 1 News ..... | 13.00/ 14.00 |
| No. 1 Mixed Papers. | 10.00/ 11.00 |
| Box Board Cuttings . | — / — |
| White Blank News . | 75.00/ 85.00 |
| Overissue News .... | 16.00/ 17.00 |
| Old Corrugated .... | 20.00/ 22.00 |
| Mill Wrappers ..... | 22.00/ 24.00 |

## Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)

| | |
|---|---|
| Coarse Polished— | |
| India ..... | .33¾/ .35 |
| Fine India ..... | .38¾/ .42½ |
| Fine Polished | |
| Unpolished— | |
| Paper Makers .... | .28¼/ .30¾ |
| Tube Rope ..... | .29 / .31½ |
| Wrapping ..... | .32 / .35¼ |
| Cotton ..... | .63¼/ .66¼ |

(Hard Fiber)

| | |
|---|---|
| Mex. Sisal ..... | .21 / .27 |
| Manila (Reprocessed) | .30 / .32 |

(American Hemp)

| | |
|---|---|
| Polished Hemp .... | .36¾/ .60 |
| Unpolished ..... | .32¼/ .54 |

# PHILADELPHIA

## Domestic Rags (New)

(F.O.B. Eastern Shipping Point)

| | |
|---|---|
| Shirt Cuttings— | |
| New White No. 1 | .11 / .12 |
| New White No. 2 | nominal |
| Light Silesias .... | .07½/ .08 |
| Black Silesias, soft | .06½/ .07 |
| New Unbleached .. | .10½/ .11¼ |
| Washable Prints . | .06½/ .07 |
| Washable No. 1 .. | .05 / .05½ |
| Blue Overall ..... | .07½/ .08 |
| Cotons—According to grades— | |
| Washable Shredding | .03½/ .04 |
| Fancy Percales .. | .06¾/ .07¼ |
| New Black Soft .. | nominal |
| Khaki Cuttings— | |
| Unbleachable Cotton Cuttings ... | .06 / .06½ |
| Bleachable Cotton Cuttings ..... | .07 / .07½ |
| Men's Corduroy .. | .05½/ .06 |
| Ladies' Corduroy . | .05 / .05½ |
| Cottonades ..... | .05½/ .06 |

## Domestic Rags (Old)

(F.O.B. Eastern Shipping Point)

| | |
|---|---|
| White No. 1 —Repacked ..... | 4.50 / 5.00 |
| Mixed White ..... | 4.00 / 4.25 |
| White No. 2—Repacked ..... | 3.50 / 3.75 |
| Thirds and Blues— | |
| Miscellaneous .... | 2.25 / 2.50 |
| Repacked ..... | 2.75 / 3.00 |
| Roofing Stock— | |
| Foreign No. 1 .. | nominal |
| Domestic No. 1 .. | 1.85 / 1.90 |
| Domestic No. 2 .. | 1.75 / 1.80 |
| Roofing Bagging .. | 1.65 / 1.70 |
| Old Manila Rope .. | 6.25 / 6.50 |

## Bagging

(F.O.B. Eastern Shipping Point)

| | |
|---|---|
| Gunny No. 1— | |
| Foreign ..... | nominal |
| Domestic ..... | 4.75 / 5.25 |
| No. 1 Clean Bright— | |
| Sisal Strings .... | .04½/ .05 |
| No. 2 Clean Bright— | |
| Sisal Strings .... | .03½/ .04 |
| Sisal Jute ..... | .02¼/ .03 |
| Scrap— | |
| No. 1 ..... | 5.00 / 5.50 |
| No. 2 ..... | 2.50 / 3.00 |

### Old Papers

| | | |
|---|---|---|
| Wool Tares, heavy | 4.25 | / 5.00 |
| New Burlap Cuttings | 6.00 | / 6.50 |

(F. o. b. Phila.)
Mill Prices, Baled

| | | |
|---|---|---|
| No. 1 Hard White Envelope Cuts, one cut | $100.00/ | $115.00 |
| No. 1 Hard White Shavings, unruled | 100.00/ | — |
| Soft White Shavings, One cut | 90.00/ | 95.00 |
| White Blank News | 75.00/ | — |
| Soft White Shavings | 80.00/ | — |
| No. 1 White Ledger | 85.00/ | 90.00 |
| Ledger, Colored | 70.00/ | 72.00 |
| No. 1 Heavy Books & Magazines | 24.00/ | 26.00 |
| Overissue Magazines | nominal | |
| New Manila Envelope Cuttings | 80.00/ | — |
| No. 1 Assorted Old Kraft | 60.00/ | 65.00 |
| No. 1 Mixed Paper | 11.00/ | 12.00 |
| Box Board Cuttings | 10.00/ | 11.00 |
| Kraft Corrugated Cuttings | 90.00/ | 100.00 |
| Old Corrugated | 24.00/ | 26.00 |
| Overissue News | 20.00/ | 22.00 |
| No. 1 News | 13.00/ | 15.00 |

## BOSTON

### Old Papers

(F. o. b. Boston)
Mill Prices, Baled

| | | |
|---|---|---|
| No. 1 Hard White Shavings, unruled | 6.25 | / 6.75 |
| No. 1 Hard White Shavings, ruled | 6.00 | / 6.50 |
| Soft White Shavings, Misc. | 6.00 | / 6.25 |
| No. 1 Fly Leaf Shavings | — | / — |
| No. 2 Fly Leaf Shavings | 4.25 | / — |
| No. 1 Groundwood Fly Leaf Shavings | 1.75 | / 2.00 |
| No. 2 Groundwood Fly Leaf Shavings | 1.50 | / 1.75 |
| Mixed Colored Shavings | 2.00 | / 2.25 |
| New Manila Envelope Cuts, one cut | 4.50 | / 4.75 |
| Hard White Envelope Cuts, one cut | 7.00 | / — |
| Triple Sorted No. 1 Brown Soft Kraft | 3.75 | / 4.00 |
| Mixed Kraft Env. & Bag Cuttings | 4.00 | / 4.25 |
| Kraft Envelope Cuttings | 5.00 | / 5.50 |
| No. 1 Heavy Books & Magazines | 1.75 | / — |
| New Manila Envelope Cuttings, one cut | — | / — |
| New Manila Envelope Cutings | 4.00 | / 4.25 |
| White Tabulating Cards | 5.00 | / — |
| Groundwood Tabulating Cards | 1.50 | / 1.75 |
| White Blank News | 2.25 | / 2.50 |
| No. 1 Assorted Old Kraft | 3.50 | / 4.00 |
| No. 1 Mixed Paper | .60 | / .65 |
| Overissue News | .90 | / 1.00 |
| No. 1 News | .70 | / .75 |
| Box Board Cuttings | .60 | / .70 |
| New Corrugated Cuttings, Kraft | 2.75 | / 3.00 |
| Old Kraft Corrugated Containers | 2.00 | / 2.25 |
| Old Corrugated Containers | — | / 1.10 |
| Jute Corrugated Cuttings | 1.07½/ | — |
| Paper Strings | 2.00 | / 2.25 |

### Bagging

(F. o. b. Boston)

| | | |
|---|---|---|
| Gunny Bagging—Foreign | — | / 4.75 |
| Domestic | 6.25 | / 6.50 |
| Sisal Rope No. 1 | 6.25 | / — |
| Sisal Rope, No. 2 | 5.50 | / — |
| Mixed Rope | 3.00 | / — |
| Mixed Strings | 1.60 | / — |
| Transmision Rope—Foreign | nominal | |
| Domestic | 3.00 | / 3.50 |
| Manila Rope—Foreign | nominal | |
| Domestic | 6.50 | / — |
| Soft Jute Rope | 6.25 | / 6.50 |
| Jute Carpet Threads | 6.00 | / — |
| Bleachery Burlap | — | / 7.00 |
| Scrap Burlap—Foreign | 6.00 | / 6.25 |
| Domestic | 6.00 | / 6.25 |
| South America | 6.00 | / 6.25 |
| Wool Tares—Foreign | 6.25 | / — |
| Domestic | 6.25 | / — |
| Austr. Wool Pouches | 7.50 | / — |
| New Zealand Wool Pouches | 7.50 | / — |
| New Burlap Cuttings | 6.50 | / — |
| Heavy Baling Bagging | 5.25 | / 5.75 |
| Paper Mill Bagging | 5.50 | / 5.75 |
| No. 1 Roofing Bagging | 2.25 | / 2.50 |

### Domestic Rags (New)

(F. o. b. Boston)

| | | |
|---|---|---|
| Shirt Cuttings—New Light Prints | .07½/ | — |
| Fancy Percales | .08 | / — |
| New White No. 1 | .11 | / .11¼ |
| New Light Flannelettes | .08 | / .08½ |
| Canton Flannels, Bleached | .10 | / .11 |
| Underwear Cutters, Bleached | .11½/ | — |
| Underwear Cutters, Unbleached | .11 | / .12 |
| Silesias No. 1 | .08 | / .08½ |
| New Black Silesias | .04½/ | — |
| Red Cotton Cuttings | .05 | / — |
| Blue Overalls | — | / .08½ |
| Soft Unbleached | .11 | / .12 |
| Blue Cheviots | .08½/ | .09 |
| Fancy | .06 | / — |
| Washable | .06 | / — |
| Khaki Cuttings | .06½/ | .07½ |
| Corduroy | .03½/ | — |
| Men's Corduroy | .04½/ | — |
| Ladies' Corduroy | .04 | / — |
| Khaki Canvas | — | / .06 |
| B. V. D. Cuttings | .11½/ | — |

### Domestic Rags (Old)

(F. o. b. Boston)

| | | |
|---|---|---|
| White No. 1—Repacked | 3.80 | / — |
| Miscellaneous | 3.20 | / — |
| White No. 2—Miscellaneous | 2.65 | / — |
| Twos and Blues, Repacked | 2.20 | / — |
| Old Blue Overalls | 2.25 | / 2.50 |
| Thirds and Blues, Repacked | 2.20 | / — |
| Miscellaneous | 1.80 | / — |
| Black Stockings | 3.50 | / 4.00 |
| Roofing Stock—No. 1 | 1.85 | / — |
| No. 2 | 1.75 | / — |
| No. 3 | 1.65 | / — |
| No. 4 | 1.65 | / — |
| No. 5, Quality A. | 1.35 | / — |
| Quality B. | 1.20 | / — |
| Quality C. | .95 | / — |
| Old Manila Rope | 6.00 | / — |

### Foreign Rags

(F. o. b. Boston)

| | |
|---|---|
| Canvas | (nominal) |
| Dark Cottons | (nominal) |
| Dutch Blues | (nominal) |
| New Checks and Blues | (nominal) |
| Old Fustians | (nominal) |
| Old Linsey Garments | (nominal) |
| New Silesias | (nominal) |

## CHICAGO

### Waste Paper

(F. o. b. Chicago)
Mill Prices, Baled

| | | |
|---|---|---|
| Shavings—No. 1 Hard White Envelope Cuts, one cut | $150.00/ | — |
| No. 1 Hard White Shavings, runruled | 140.00/ | — |
| No. 1 Soft White Shavings | 120.00/ | — |
| No. 1 White Ledger | 85.00/ | — |
| No. 1 Heavy Books & Magazines | 35.00/ | — |
| White Blank News | 80.00/ | 85.00 |
| Mixed Kraft Env. & Bag Cuttings | 90.00/ | 110.00 |
| No. 1 Assorted Old Kraft | 35.00/ | — |
| Overissue News | 24.00/ | — |
| No. 1 News | 21.00/ | — |
| No. 1 Mixed Paper | 13.00/ | — |
| Old Corrugated | 26.00/ | — |
| Mill Wrappers | 17.00/ | — |

# MARKETS

BLANC FIXE—Prices firm. Continued heavy demand. Pulp is currently quoted at $85 in bags, car lots at works, 6 cents per lb., l.c.l., deld.; by-product $75 per ton, car lots at works, 6 cents per lb., l.c.l., deld.

BLEACHING POWDER — Supply adequate. Delivery good. Prices range from $3.75 to $4 per 100 pound drums, l.c.l. works.

CASEIN — Domestic production improving though well behind that of a year ago. Prices strong. Heavy foreign inquiry keeps import market firm. Current prices on processed acid precipitated casein at 32 to 34 cents per pound for domestic grades and 29 to 31 cents for imported grades, f.o.b. shipping point.

CAUSTIC SODA — Labor strike has worsened supply. Demand heavy. Solid caustic is reported at $2.85 per cwt.; flaked and ground is quoted at $3.25 per cwt. in 400 pound drums, $3.75 to $4 per cwt. in 100 pound drums—car lots at works; liquid 50 percent in tank cars at $2.25 per cwt.; liquid 73 percent in tank cars at $2.35 per cwt., at works.

CHINA CLAY—Domestic grades and imported in good supply. Filled is $9 to $11.50 per ton, car lots; coating clay is $14 to $22. Imported clay quotation, short tons, $16 to $35, export warehouse.

CHLORINE — Supply extremely tight. Production cut back by labor condition. Currently quoted at $2.25 per cwt. in single unit tank cars, at $2.55 to $3.75 per cwt., in multi-unit tank cars, f.o.b. works.

ROSIN — Supply good. Domestic buying slow. Export sale awaits ECA action. Gum rosin in drums per 100 pounds net in car lots, f.o.b. Savannah: B, $6.50; G, H, I, K, $6.76. Wood rosin per 100 pounds net, car lots, f.o.b. Savannah: B, $4.50 to $5; FF, $5.50 to $6.

ROSIN SIZE — Seventy percent, gum and pale wood grades. Supply ample. Demand good. Tank cars $5.75 to $6 f.o.b. southern shipping point.

SALT CAKE—Demand continues ahead of supply with slight improvement in shipments. Production under contract. Domestic salt cake is quoted at $25 to $28.

SODA ASH — Supply worsened by strike. Deliveries behind schedule. Current prices, car lots, per 100 pounds; in bulk, $1.10; in paper bags, $1.30; and in barrels, $1.70.

SODIUM BICARBONATE—Strong demand with supply somewhat tighter. Reported as $1.85 per cwt. paper bags, carload lots.

STARCH—Extremely heavy demand. Depleted supply. Deliveries somewhat behind. Export inquiry dull. Five cent rise in freight rates reflected in prices. Pearl grade quoted at $7.01 per 100 pounds; powdered starch at $7.12 per 100 pounds; car lots, New York.

SULPHATE OF ALUMINA—Prices unchanged. Supply steady. The commercial grades are quoted at from $1.15 to $1.30 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is $2 per 100 pounds in bags, car lots, at works.

SULPHUR—Prices unchanged. Supplies ample. Annual contracts are quoted at $16 to $18 per long ton, f.o.b. mines; the price f.o.b. at Gulf ports is $17.50 to $19.50 per long ton.

TALC—No change in domestic market. Demand far in excess of supply. Domestic grades are currently quoted at $23 per ton in paper sacks, f.o.b. mills; Canadian at $35 and up per ton. All prices in car lots.

TITANIUM DIOXIDE—Market unchanged. Extremely tight supply. No early easing seen in situation. Shipments on allocation. Anastase 17½c lb. carload lots, 18-18½c l.c.l., rutile, 19½c lb. carload lots, 20-20½c l.c.l.; 50-lb. bags, f.o.b. plant, minimum freight allowance.

# IMPORTS

## New York Imports

WEEK ENDING MAY 8, 1948

SUMMARY

| | |
|---|---|
| Newsprint | 4202 rolls |
| Wrapping Paper | 80 rolls |
| Sulphite Paper | 40 rolls |
| Paper Napkins | 1 cs., 75 ctns. |
| Tissue Paper | 61 cs. |
| Printing Paper | 68 cs. |
| Photo Paper | 1 cs. |
| Serviettes | 13 crates |
| Filter Paper | 32 cs., 60 bls. |
| Gummed Paper | 74 cs. |
| Glass Paper | 1 cs. |
| Cardboard | 9 cs. |
| Drawing Paper | 13 cs. |
| Parchment | 2 cs. |
| Miscellaneous Paper | 1412 rolls |

### NEWSPRINT

Gilman Paper Co., Stockholm, Gothenburg, 147 rolls.

Montmorency Paper Co., Brigus, St. Johns, N. F., 1720 rolls.

Montmorency Paper Co. (Alexandria, Va.), Brigus, St. Johns, N. F., 1769 rolls.

H. G. Craig Co., Kermic, Donnacona, 341 rolls.

China American Paper & Pulp Co., Alma Victory, Trieste, 225 rolls.

### WRAPPING PAPER

The Borregaard Co., Inc., Stockholm, Gothenburg, 80 rolls.

### SULPHITE PAPER

Chase National Bank, Stockholm, Gothenburg, 40 rolls (unbleached).

### PAPER NAPKINS

Globe Shipping Co., Stockholm, Gothenburg, 1 cs.

H. W. Robinson Co., Florida, Copenhagen, 75 ctns.

### TISSUE PAPER

Stevens Nelson Paper Corp., Trein Maersk, Yokohama, 20 cs. (insulating).

B. F. Drakenfeld & Co., American Importer, Liverpool, 23 cs.

B. F. Drakenfeld & Co., Media, Liverpool, 7 cs. (pottery).

B. F. Drakenfeld & Co., Media, Liverpool, 11 cs.

### PRINTING PAPER

Olympic Shipping Co., American Shipper, Havre, 68 cs.

### PHOTO PAPER

Lep Transport, Inc., American Veteran, London, 1 cs.

### SERVIETTES

(———), Mauretania, Southampton, 4 crates.

(———), Media, Liverpool, 9 crates.

### FILTER PAPER

H. Reeve Angel & Co., Inc., Mauretania, Southampton, 60 bls.

H. Reeve Angel & Co., Inc., America, Southampton, 2 cs.

H. Reeve Angel & Co., Inc., Welsh Prince, London, 16 cs.

H. Reeve Angel & Co., Inc., American Veteran, London, 14 cs.

### GUMMED PAPER

B. F. Drakenfeld & Co., Media, Liverpool, 74 cs.

### GLASS PAPER

S. Stern Henry, Welsh Prince, London, 1 cs.

### CARDBOARD

(———), Belgium Victory, Antwerp, 9 cs.

### DRAWING PAPER

H. Reeve Angel & Co., Inc., Welsh Prince, London, 4 cs.

J. J. Murphy, Welsh Prince, London, 2 cs.

Winsor Newton, Inc., American Veteran, London, 6 cs.

H. Reeve Angel & Co., Inc., American Veteran, London, 1 cs.

### PARCHMENT

Andrews Paper Co., Queen Mary, Southampton, 1 cs.

Gerhard & Hey, Queen Mary, Southampton, 1 cs.

### MISCELLANEOUS PAPER

Bank of The Manhattan Co., Stockholm, Gothenburg, 1136 rolls.

Green Kriegsman Paper Co., Stockholm, Gothenburg, 276 rolls.

### RAGS, BAGGINGS, ETC.

Amtorg Trading Corp., Normandiet, Murmansk, 258 bls. cotton waste.

1st National Bank Chicago, Normandiet, Murmansk, 2605 bls. cotton waste.

C. Comiter, American Merchant, Shanghai, 100 bls. cotton waste.

Melshers, Inc., American Merchant, Shanghai, 216 bls. cotton waste.

O'Brien Products, Inc., Trein Maersk, Shanghai, 100 bls. cotton waste.

Loumar Textile By-Products, Inc., Trein Maersk, Shanghai, 160 bls. old waste bagging.

Williamson Northrup Co., Stockholt, Rio de Janeiro, 46 bls. cotton waste.

American Cotton Products Co., Stockholt, Santos, 149 bls. cotton picker waste.

American Express Co., American Importer, Liverpool, 15 bls. wool rags.

Burnet Foreign Trading Corp., Dona Nati, Shanghai, 200 bls. cotton waste pickers.

(———), Alma Victory, Venice, 55 bls. waste bagging.

Green Textile Associates, Exchester, Alexandria, 13 bls. cotton waste.

E. J. Keller Co., Inc., Exchester, Alexandria, 75 bls. burlaps.

Walaworth Co., Exchester, Alexandria, 76 bls. old bagging.

Royal Manufacturing Co., Bastogne, Antwerp, 132 bls. cotton waste.

E. J. Keller Co., Inc., Hibbing Victory, Antwerp, 60 bls. old bagging.

(———), Jefferson City Victory, Antwerp, 59 bls. bagging.

E. J. Keller Co., Inc., Jefferson City Victory, Antwerp, 92 bls. old bagging.

Railway Supply & Manufacturing Co., Uruguay, Rio de Janeiro, 92 bls. cotton waste.

Tradesmans National Bank Trust Co., Santa Cecilia, Callao, 38 bls. cotton waste.

(———), Santa Cecilia, Callao, 7 bls. cotton waste.

A. de Vries Trading Corp., Cornelius Maersk, Rouen, 32 bls. rags.

(———), Media, Liverpool, 16 bls. wool waste rags.

(———), Belgium Victory, Antwerp, 128 bls. jute waste.

(———), Welsh Prince, London, 66 bls. old khaki webbing, 46 bls. new colored cottons, 30 bls. knit parachute packs.

Midwest Waste Material Co., Robert Maersk, Rotterdam, 102 bls. paper stock, 646 bls. bagging.

Castle & Overton, Inc., Leerdam, Rotterdam, 118 bls. old cotton rags.

E. J. Keller Co., Inc., Exchequer, Bombay, 157 bls. old jute rags.

Castle & Overton, Inc., Exchequer, Genoa, 117 bls. old bagging.

Manufacturers Trust Co., Exchequer, Genoa, 119 bls. old waste bagging.


# brightening

"Virginia" Zinc Hydrosulphite ($ZnS_2O_4$) is one of the most effective and economical brightening agents available to the pulp and paper industry. It is supplied expressly as a reducing, brightening, and decolorizing reagent for ground wood pulp, folding cover, and de-inked stock. "Virginia" is a prime producer of Zinc Hydrosulphite . . . the only producer of *high test*, 85-86 percent pure $ZnS_2O_4$. It is shipped in 250-pound, single trip steel drums.

•

**Send for descriptive literature on "Virginia" Zinc Hydrosulphite. Write Virginia Smelting Company, West Norfolk 3, Virginia.**

VIRGINIA

*Zinc Hydrosulphite*

Chase National Bank, American Planter, Antwerp, 145 bls. jute waste.

OLD ROPE

Brown Bros. Harriman Co., Stockholm, Gothenburg, 62 coils.
(———), Mahronda, Calcutta, 357 bls. old hemp rope cuttings.
(———), Exchequer, Calcutta, 127 bls. old hemp rope cuttings.

GLUESTOCK, ETC.

Transatlantic Animal By-Products Corp., Trein Maersk, Hong Kong, 150 bags hideglue.
Karr Ellis Co., Media, Liverpool, 295 bls. dry hide cuttings.
National City Bank, Welsh Prince, London, 75 bls. gluestock.

CASEIN

T. J. Kane & Co., Uruguay, Buenos Aires, 440 bags.
Casein Co. of America Div. The Borden Co., Uruguay, Buenos Aires, 1760 bags (ground lactic).
American British Chemical Supplies, Uruguay, Buenos Aires, 1000 bags (lactic).
American Cyanamid Co., Uruguay, Buenos Aires, 2000 bags.
East Asiatic Co., Uruguay, Buenos Aires, 1000 bags (lactic).
Crawford & Co., Uruguay, Buenos Aires, 300 bags (lactic).
Paul A. Dunkel Co., Uruguay, Buenos Aires, 1300 bags (lactic).

## BOSTON IMPORTS

WEEK ENDING MAY 8, 1948

American Express Co., American Shipper, Havre, 1 cs. letter paper.
National City Bank, Bibbing Victory, Rotterdam, 29 rolls newsprint.

## PHILADELPHIA IMPORTS

WEEK ENDING MAY 8, 1948

Leigh Textile Co., American Importer, Manchester, 43 bls. mixed bagging.
Bank of The Manhattan Co., American Importer, Manchester, 76 bls. colored gabardine rags.

## Warder Box Staff Quits in Strike

NIAGARA FALLS, N. Y. — Approximately 75 employes of the Warder Paper Box Company walked off their jobs in a strike for recognition of District 50, United Mine Workers of America as bargaining agent for workers in the plant, District 50 officials said.

According to the officials, 98 percent of the employes of the plant signed a petition asking that District 50 be recognized by the management of the plant. They said that the owner of the plant, James H. Warder, asked for a week "to make up his mind" on April 19, and that later he flatly refused to recognize the union as bargaining agent in the plant which has no local union at present.

The UMW official said that some male employes are receiving 57 cents an hour, and that some female employes are being paid 55 cents an hour. He added that the workers at the plant "are determined to stay out until their demands for recognition of District 50 as bargaining agent are met."

Mr. Warder declined to make any comment on the situation.

## Lakeview Mill Observes Clean-Up Week

NEENAH, Wis. — Kimberly-Clark Corporation's Lakeview mill observed fire prevention and clean-up week last week. Department supervisors, accompanied by foremen, fire wardens and chiefs, inspected departmental areas, stressing cleanliness, clear aisles and general neatness. They also studied location of fire fighting equipment, alarm boxes and exits.

Wardens and leaders heard discussions of their duties and fire drills were held. The four fire squads, each of them composed of eight men, fought the imaginary fires. Group meetings were held during the week for fire wardens, alternates, fire squads and unit tenders. They saw a film, "Chemistry of Fire," and discussed the use of several types of extinguishers in the mill.


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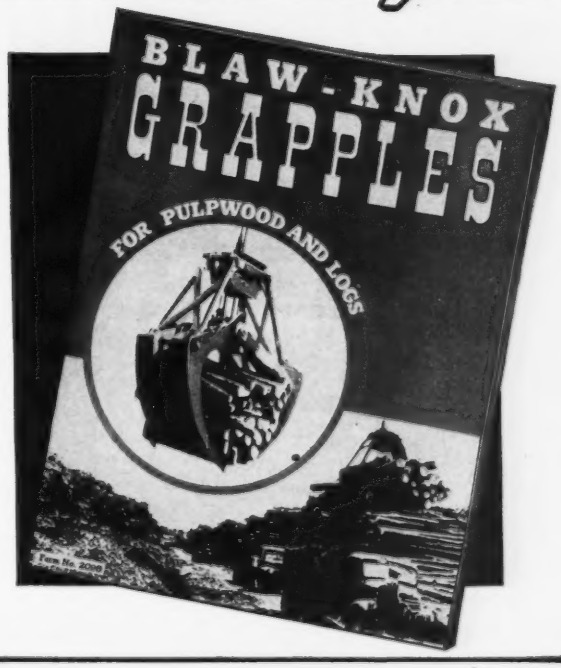

# DIGESTED

The responsibility for controlling an inflationary spiral rests on the community rather than upon the individual business man. It is primarily the responsibility of the Federal Government. The Federal Government has the power and the equipment and the "know-how" to do the job. The principal elements are fiscal policy, monetary policy and under extreme circumstances, direct price control and rationing. Although there is disagreement as to the precise balance of controls and the ways that they might be applied under a given situation, there is nevertheless, no serious doubt among professionals as to the effectiveness of these implements.

You can contribute more to checking this inflation in your capacity as educators than in your capacity as price-setters. Economic education is your most effective inflation weapon. You have great opportunity, power, and responsibility for moulding public, employee and congressional opinion. Through your contacts with other executives, through associations like this one, through house organs, employee mailings and speeches, you can make it not only politically feasible but politically necessary for the government to curb this inflation. The statesmanlike job that the General Electric Company has done on economic education of employees points the way. — DR. JOEL DEAN, *from an address before the Chamber of Commerce of the United States.*

## Production Ratio Report*

(Production as per cent of six-day capacity)

### COMPARATIVE WEEKLY SUMMARIES

| Current Weeks—1948 | | Corresponding Weeks—1947 | |
|---|---|---|---|
| March 27 | 98.2 | March 29 | 107.8 |
| April 3 | 100.0 | April 5 | 106.1 |
| April 10 | 102.4 | April 12 | 100.7 |
| April 17 | 100.4 | April 19 | 105.9 |
| April 24 (Revised) | 102.5 | April 26 | 105.3 |
| May 1 | *103.5* | May 3 | 107.5 |

### COMPARATIVE MONTHLY SUMMARIES

| 1947 | | | | | | 1948 | |
|---|---|---|---|---|---|---|---|
| Jan. | 102.1 | May | 106.2 | Oct. | 109.5 | | |
| Feb. | 105.9 | June | 106.0 | Nov. | 109.3 | Jan. | 100.9 |
| Mar. | 106.1 | July | 93.5 | Dec. | 101.5 | Feb. | 100.3 |
| Apr. | 105.1 | Aug. | 104.2 | | | Mar. | 100.6 |
| | | Sept. | 102.0 | Year Avg. | 104.3 | Apr. | *102.5* |

### COMPARATIVE YEARLY SUMMARIES

| | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| Year to Date | 91.3 | 102.5 | 88.7 | 88.3 | 88.5 | 100.1 | 105.1 | *100.9* |
| Year Average | 97.4 | 90.4 | 87.8 | 88.1 | 89.4 | 101.1 | 104.3 | |

NOTE: *As of January 10 capacity base increased by 13.3%.*

### PAPERBOARD OPERATING RATIOS†

| Current Weeks—1948 | | Corresponding Weeks—1947 | |
|---|---|---|---|
| March 27 | 104 | March 29 | 102 |
| April 3 | 98 | April 5 | 102 |
| April 10 | 103 | April 12 | 96 |
| April 17 | 100 | April 19 | 102 |
| April 24 | 102 | April 26 | 100 |
| May 1 | *102* | May 3 | 102 |

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Year Avg. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1947 | 99 | 103 | 101 | 100 | 101 | 101 | 90 | 99 | 96 | 101 | 99 | 89 | 98 |
| 1948 | 99 | 100 | 102 | *102* | | | | | | | | | |

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.


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# EDITORIAL

## Paper in the Piedmont

Perhaps at some distant date a statistician will contrive to set up a computation that will make paper containers, their production and consumption, a useful index of rising or falling trade currents. Until that time shall have come, however, the industry is given only bare bits of information. Such as that which the Greensboro Daily News recently spread before its public, when it celebrated the advent of substantial new industry into its corner of North Carolina by a summary of the growth of the paper container industry there.

Accofding to a survey conducted by the News, eight paper box, container and transparent wrapping firms in the Greensboro-High Point area now represent a relatively new but growing industry in this section of the Piedmont. More than 400 workers are employed in this field of manufacture although five of the companies have been established only since the war.

Two of the companies, including one of the largest, opened in 1947. Three are located in Greensboro. They are Container Corporation of America, American Paper Products Company, and Transparent Packings, Inc. Others include Southern Packing Corporation, Henley Paper Company, High Point Box Company and Carolina Container Company, all of High Point; and Highland Container Company, Inc., of Jamestown.

"Among several firms which have announced plans for starting paper box plants in North Carolina," the Employment Security Quarterly states, "is the Gaylord Container Corporation, which plans to open a corrugated container plant in Greensboro and a fabricating plant in Hickory. The Gaylord company now has a sales organization in Jefferson Standard Building.

"One local plant is now the only one in North Carolina engaged in turning out paper cores and tubes. This company converts approximately 25 tons of paper a week into finished products for shipment throughout the South and Southwest."

## Industrial Emphasis

Only a slight reversal of emphasis is necessary to turn a financial page item into a statement of high industrial and economic significance. It may be well from a stock-quotation point of view to trace, as a Canadian authority has done, the effect of increased newsprint production on the earnings records of 12 major companies in any given period or for any given interval. But the repercussions of such conclusions are not always happy. Only the other day a publisher was talking about his source of paper supply: "Back up there in the woods, making paper and making money."

It is quite as cogent, perhaps even more lastingly impressive if some one should find it desirable to look first at the earnings statements, and from that point go to discover that these actually reflect an increase in newsprint production of some 36 per cent in the past two years by the same dozen mills.

## Opportunity's Challenge

The seven-league boots in which Dr. Charles Allen Thomas sees modern industry approaching a new horizon for the technically trained man not only bring into view the broader opportunities which he described recently but also suggest new footprints which he will have to make in consequence of his promotion. In his speech before the New York Section of the American Chemical Society last week sounded the note that with the development of a more highly specialized industry the scientist not only has an opportunity to take a more active part but is faced with the duty to fit himself for that part.

"Modern industry," Dr. Thomas said, "seems to be stepping ahead with seven league boots. The merchandise, the service and the administration of modern business are so scientific and complex that technical training is needed in almost all departments." He asserted that the biggest problem confronting the scientist caught up in the definite trend toward industrial leadership is the perplexing difference that arises out of dealing with people instead of things.

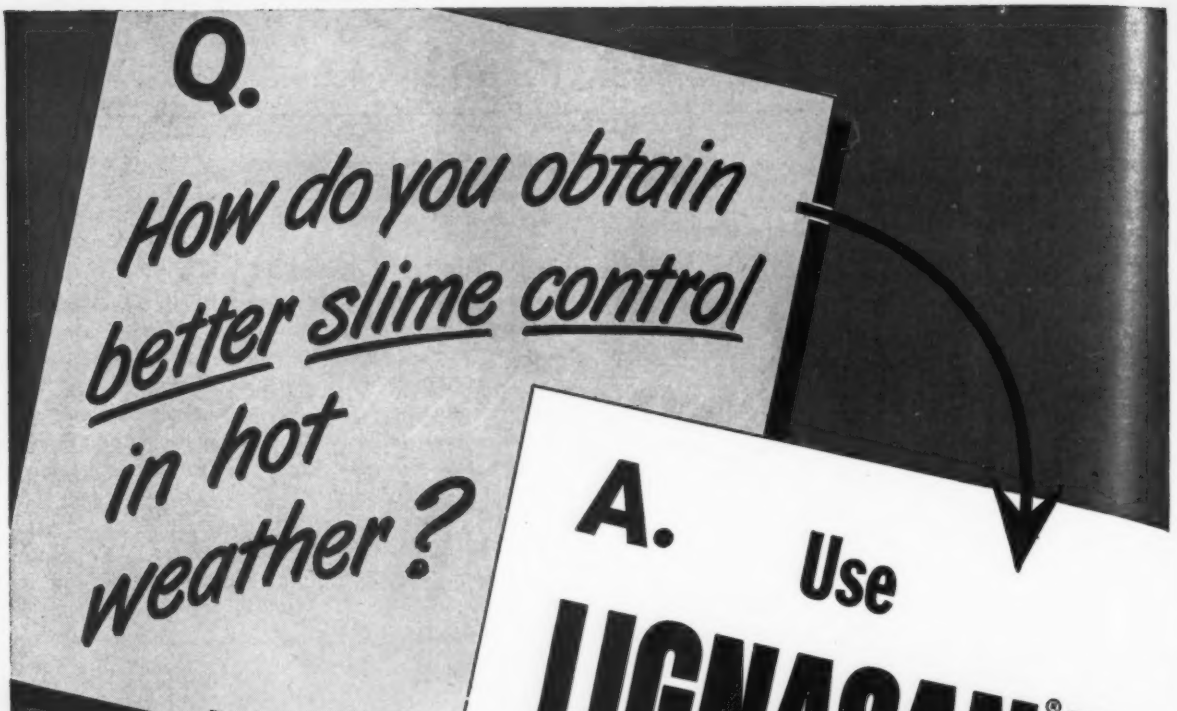
"In the laboratory," he asserted, "the scientist is accustomed to relying upon unchanging scientific laws. In an executive capacity, the scientist finds he is dealing primarily with people who are constantly changing their points of view, who are always striving and who cannot always be depended upon to act or react twice in exactly the same way. He has been accustomed to handling things that can be measured. Now he must deal with things that are unmeasurable.

"His reputation may be made or broken at any time by the cooperation he can secure from his human instruments," Dr. Thomas said. "As a scientist he has been accustomed to taking complete credit for work well done. As an executive he must develop the habit of taking no credit at all. He must appear not to be part of the reacting components of a working combination —but merely the catalyst whose presence causes the proper things to happen."

Dr. Thomas added that a course in self-education is necessary. "The scientist must be as familiar as possible with the way people think, the way they act and with the motives that influence their lives," he continued. "He must have some knowledge of finance. He must be conscious of labor problems and keep informed on the changes in employer-employee relationships.

W. L. Cook

Editor.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# Concentration of White Water Sludges

## I. Sludge Characteristics and Some Factors Affecting Concentration*

By Willem Rudolfs and A. J. Palladino
Chairman and Research Assistant
Rutgers University, New Brunswick, N. J.

The clarification of white water from the manufacture of paper and paperboard results in a voluminous sludge. The volume of sludge may vary with the method of clarification, but handling and disposal remains one of the major problems connected with the treatment of mill wastes. If the watery sludges could be concentrated effectively and economically, either reuse or disposal would be more feasible and be a step forward in the general problem of white water treatment.

Search of the literature reveals that little information is available regarding the treatment of white water sludge, other than natural concentration by standing or ponding and vacuum filtration. Some of the sludges are difficult to dewater without conditioning with chemicals.

The studies on white water sludge concentration were undertaken to determine the nature and characteristics of the sludges and the effect of factors such as time, temperature, mixing, flotation, and coagulants, on concentration, and to indicate possibilities of improved methods of concentration.

### General Nature of Sludges

The nature of white water sludge is affected by the type of raw materials used, the operating procedure, and the capacity and efficiency of save-all equipment, which may be of the wire cylinder, sedimentation or flotation type. Rudolfs and Axe *(1)* have shown white water characteristics to be variable. The average solids composition of paperboard mill white waters as compared with that of strong domestic sewage is as follows:

| | White Water[1] | | Strong Sewage[2] | |
|---|---|---|---|---|
| | ppm | % Volatile | ppm | % Volatile |
| Susp. Solids | 521 | 79 | 372 | 59 |
| Settleable Solids | 477 | 79 | 223 | .. |
| Non-Settleable Solids | 45 | 78 | 149 | .. |
| Dissolved Solids | 1276 | 41 | 858 | .. |
| Total Solids | 1797 | 52 | 1230 | 66 |

[1] As given by Rudolfs and Axe *(1)*
[2] As given by Rudolfs *(2)*

The figures show the suspended, dissolved and total solids of white water to be about 1.5 times those of strong sewage, but the ratio of suspended solids to total solids is about the same for the two wastes. The figures indicate also the greater settleability and higher volatile content of white water are made up of fibre, sizing and filler material and, in the case of paperboard wastes, of considerable quantities of impurities. Paper white waters, depending upon the quality of the product, have lesser amounts of extraneous matter. Rudolfs and Axe *(1)* in a survey of eight paperboard mills found the average suspended solids loss in the white water to be about 4.35 lbs./1000 gallons, of which about 80% was apparent fibre, i.e., volatile. Other investigators have variously estimated the suspended solids loss in white water at from 1 to 5 lbs./1000 gallons. About 90% of the total suspended solids were settleable in two hours. In contrast, 60% suspended solids reduction is accomplished by two hour settling of sewage. By chemical coagulation, Rudolfs and Axe *(3)* attained 90-95% clarification of paperboard waste waters. The settleability of white water solids varies also with the degree of recirculation of white water, inasmuch as this practice results in a build up of fines, slimes, and colloidal matter which hinders settling. In general, the amount of recirculation practiced is in inverse relation to the quality of the product.

In mills with recovery equipment the removal of

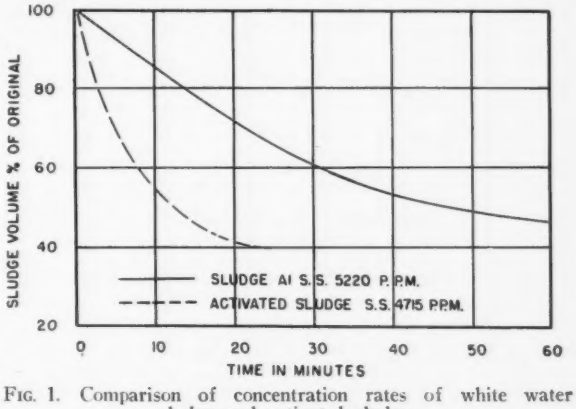


FIG. 1. Comparison of concentration rates of white water sludge and activated sludge.

* Paper of the Journal Series, New Jersey Agricultural Experiment Station, Department of Sanitation, Rutgers University.

**INDUSTRIAL DEVELOPMENT**

**Paper Trade Journal, in this new section, proposes to make space available for discussion of administration and operational problems of the pulp and paper industry, as well as for the presentation of independent studies and research on technical and engineering subjects. Noteworthy features of paper mills, converting plants, associated industries and institutions also will be presented, as they become available. These pages will be open to all who are qualified to discuss subjects within these limits. Manuscripts, submitted for approval, will be welcomed.—E. P. McGINN, Industrial Editor.**

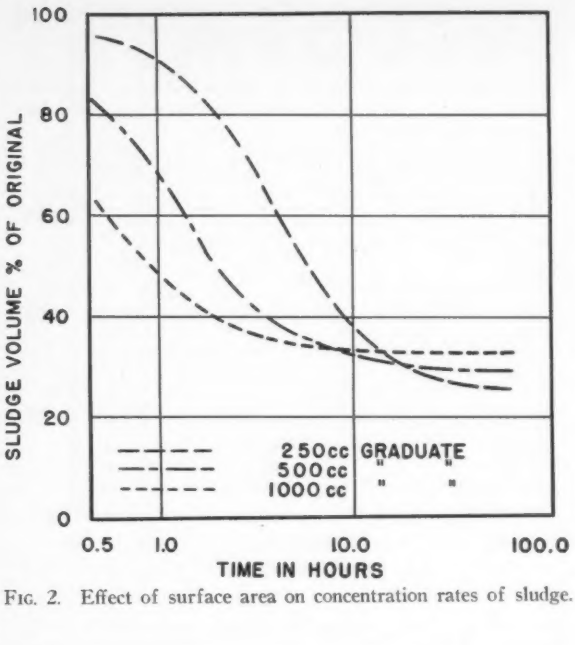


FIG. 2. Effect of surface area on concentration rates of sludge.

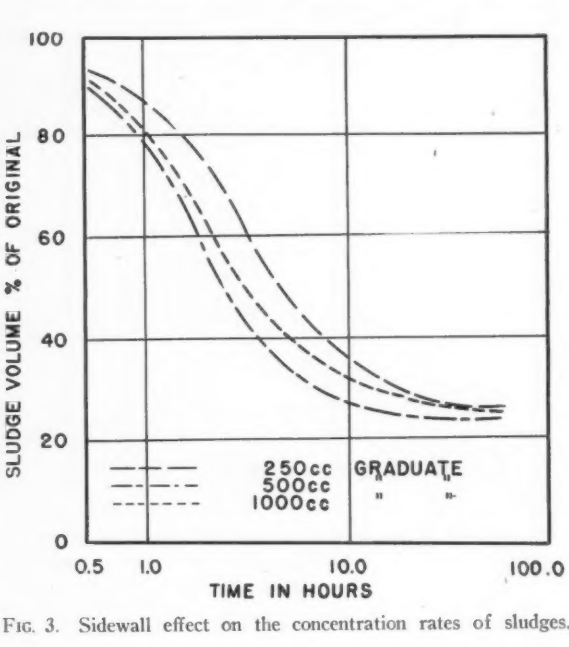


FIG. 3. Sidewall effect on the concentration rates of sludges.

suspended solids by the save-all will result in a higher percentage of fines and a higher ratio of dissolved solids to suspended solids in the white water. In unrecovered white water from paperboard mills, this ratio is from 2-1 to 3-1. Of eight mill recovery units studied,

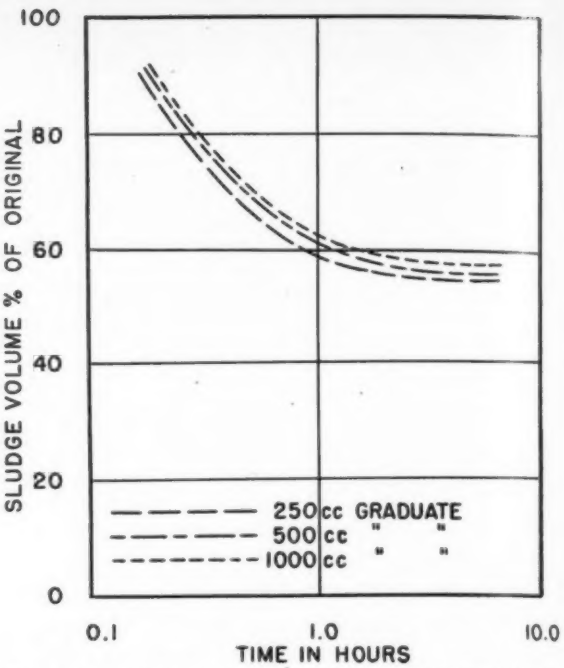


FIG. 4. Concentration rates of granular (pickling liquor) sludge.

Rudolfs and Axe *(1)*, found coagulation and settling 80-90% efficient in suspended solids removal, settling 40-60% efficient, and vacuum filters 23-68% efficient. Flotation save-all equipment is reported by manufacturers to be over 90% efficient.

### Volume and Consistency

Eldridge *(4)* states that white water sludge removed from either flotation or sedimentation units contains from 2 to 3% solids and the volume averages 2-4% of volume of waste treated. Rudolfs and Axe *(3)* found that the sludge volume obtained by plain settling of paperboard white waters averaged 7.7% of the original waste volume. Both these investigators obtained greater sludge volumes and sludge of higher water content when coagulants were used. According to Eldridge *(4)* the Sveen-Pederson save-all, in which air is dissolved in white water under p.s.i. pressure and then released to atmospheric pressure causing flotation of the solids results in a "slush" of 1.3% solids. In comparison with the solids content of sewage sludge averaging 4-5%, the solids concentration of white water sludge is low. Its range of concentration is more nearly equal to that of return sewage activated sludge.

If the sludge volume is assumed to be 3% of the waste volume, 30,000 gallons of sludge will be produced per million gallons of waste. This volume of waste will be discharged per day by an average paperboard mill

TABLE I.—SLUDGE CHARACTERISTICS

| | Mill A | | | | Mill B | | | | | Mill C | Mill D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 | A2 | A3 | A4 | B1 | B2 | B3 * | B4 | B5 | C1 | D1 | D2 | D3 |
| Solids, per cent | 0.60 | 1.24 | 0.45 | 0.80 | 1.28 | 1.80 | 1.00 | 1.27 | 0.87 | 0.92 | 0.75 | 0.89 | 1.4 |
| Ash, per cent | 27 | 24 | 21 | 25 | 21 | 20 | 21 | 19 | 18 | 31 | 50 | 10 | ... |
| Suspended solids, per cent | 0.52 | 1.14 | 0.34 | 0.64 | 1.15 | 1.66 | 0.89 | 1.13 | 0.75 | 0.86 | 0.61 | 0.85 | ... |
| Ash, per cent | 24 | 23 | 17 | 25 | 15 | 16 | 13 | 13 | 9 | 28 | 51 | 8 | ... |
| Ratio sus. solids to total solids | 0.87 | 0.92 | 0.76 | 0.80 | 0.90 | 0.92 | 0.89 | 0.89 | 0.88 | 0.94 | 0.81 | 0.96 | ... |
| pH | 6.5 | 5.2 | 6.9 | 6.1 | 5.1 | 5.5 | 5.5 | 6.8 | 5.0 | 4.6 | 5.6 | 8.3 | ... |
| Alkalinity, p.p.m. | 100 | 88 | 90 | 220 | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Acidity, p.p.m. | 50 | .... | 25 | 170 | ... | ... | ... | ... | ... | ... | ... | ... | ... |

* Sludge collected without use of coagulants. Alkalinity and acidity in p.p.m. $CaCO_3$.

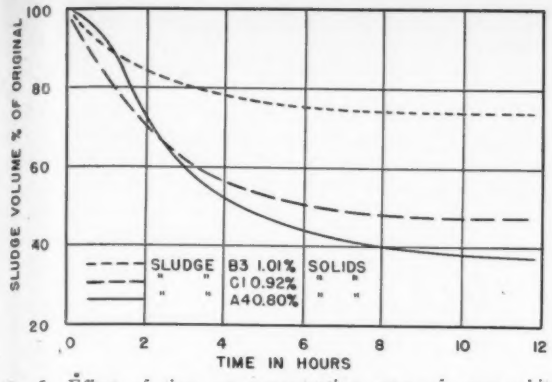


FIG. 5. Effect of time on concentration rates of some white water sludges.

producing 100 tons of product according to Rudolfs and Axe *(1)*. By way of contrast, the sludge volume from two hour settling of sewage varies from 2,000 to 7,000 gallons per million gallons.

In the course of this investigation, three general techniques for the thickening of white water sludges were explored. These were concentration by gravity settling, by flotation and by vacuum filtration.

## Materials, Methods and Experimental Procedures

The white water sludges used in this study were obtained from three paperboard mills, referred to in this report as mills A, B and C, and one tissue mill, referred to as mill D. The paperboard sludges were, in most cases, coagulated from the mill wastes with alum in doses ranging from 0.5 lb./1000 gallons to 2.0 lbs./1000 gallons and with activated silica in doses equal to one-tenth the alum doses. For purposes of comparison, sludge samples from mills A and B were collected also by two hour plain sedimentation. White water from mill A had passed through a wire cylinder save-all before the sludge was collected from it. On the other hand, mill B sludge samples were collected from the waste before passage through a save-all. The sludge sample from mill C was obtained from the plant recovery unit, having been coagulated with alum and activated silica. Sludges from mill D were collected by mill personnel by inducing flotation of the fibre particles in the mill waste. This waste represented that portion of the filtrate from the cloudy port of a vacuum filter save-all and consisted, therefore, mainly of short fibre material.

Except in specific instances mentioned in the individual test procedures, 500 cc. graduates were used as settling containers in the concentration of gravity tests.

Analyses of the sludge characteristics included pH, total, suspended and dissolved solids content and ash, and in some cases, acidity and alkalinity. In some cases, turbidities of effluents from the various processes were determined. These were determined by use of an electrophotometer, which had been calibrated against the Jackson Candle Turbidimeter.

In the gravity settling tests 300 cc. sludge samples were allowed to stand in 500 cc. graduates, and sludge volume readings made at staggered intervals as follows: 10 min., 30 min., 1 hour, 2 hours, 4 hours, 6 hours and at approximately 24-hour intervals thereafter up to 142 hours.

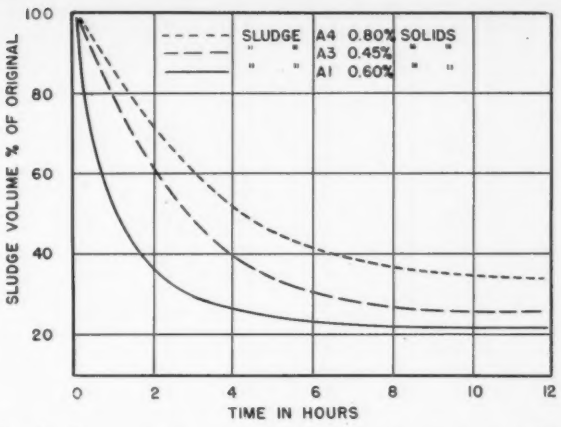


FIG. 6. Concentration rates of sludges with varying initial solids content.

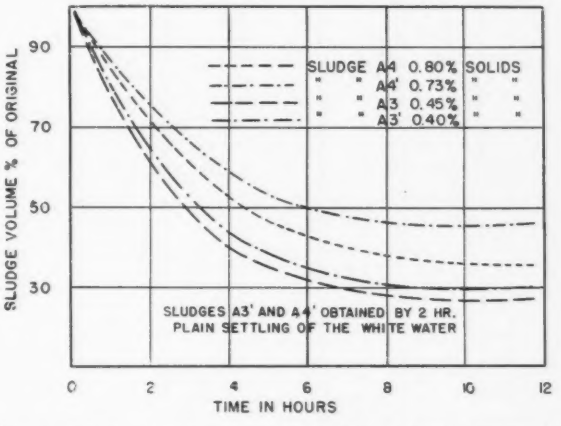


FIG. 7. Effect of natural and artificially induced changes in initial concentration on the concentration rates of sludges.

## Sludge Characteristics

The characteristics of the sludges utilized in this investigation are shown in Table 1. The solids concentration of these sludges varied from 0.45% to 1.8% and the ratio of the suspended solids total solids varied from 0.76 to 0.96. The latter ratio indicates that only a small percentage of the total solids were in the dissolved state. The ash contents of the total and suspended solids were, with exception of two wastes below 27%. Sludge D1 was collected with large quantities of alum which accounts for its high ash content. In all cases there was only slight difference between the percentage ash of the total solids and that of the suspended solids.

For comparison with these sludges, two sludge samples, obtained by two hour plain settling, were collected from mill A white water simultaneously with the collection of Sludges A3 and A4. The analyses of these sludges, together with those of Sludges A3 and A4 and those of the white water from which these sludge samples were obtained, are shown in Table 2. The characteristics of the sludge obtained by alum coagulation of the white water differed only slightly from those of the sludges obtained by 2 hour plain settling of the white water. The alum coagulated sludge samples were of slightly higher solids concentration in each case.

Although the suspended solids concentration of the

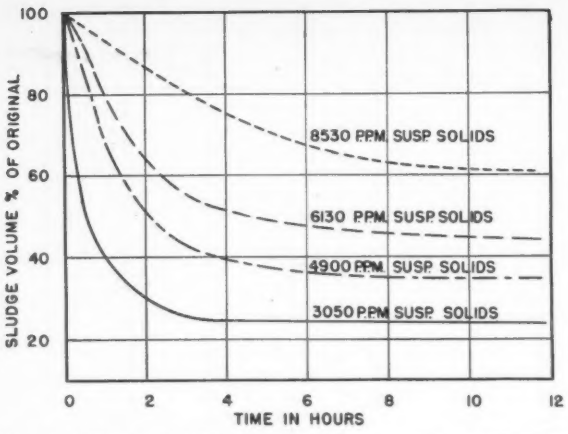


FIG. 8. Effect of initial concentration on the concentration rates of white water sludge.

two white water samples in Table 2 were approximately the same (330 ppm), the sludge produced, in one case, had a solids concentration of about 0.45%, and in the other case, about 0.80%. This discrepancy is due to the variability of the nature of the white water although from the same mill. However, both the two hour settled sludges were of lower concentration than most of the sludges used in this study.

From the relationship between the alkalinity of the white water and that of the alum coagulated sludge, it seems that the small alum doses used for coagulation decreased the alkalinity very slightly.

### Concentration By Gravity Settling

Camp *(5)* has reported that the rate of subsidence in a settling tank is a function of the settling quality of the suspension and the hydraulic characteristics of the tank. The settling quality of white water sludge can probably best be illustrated by comparing its concentration rate with that of return activated sludge. The latter, of all waste sludges, most closely approximates the suspended solids content and settling characteristics of white water sludge. Fig. 1, which depicts the short-period concentration rates of white water sludge from a paperboard mill and activated sludge of approximately the same suspended solids concentration demonstrates the more rapid concentration rate of the latter. The greater colloidal matter content of white water sludge and probably its smaller equivalent particle size account for this discrepancy. The equivalent particle size of a slurry of given concentration made up of particles of heterogeneous size is that diameter of particles of uniform size which if settled in a slurry of concentration equal to that of the heterogeneous slurry will have the same velocity of subsidence as the latter. According to Camp *(5)* the equivalent diameter of 2,000 ppm activated sludge is 1 mm. The length of fibre in Sludge A4 was found by microscopic examination to vary from .045 to 4.5 mm.

Casual inspection of Fig. 1 shows the very nearly linear nature of the first part of the concentration time curve for white water sludge. According to Deane *(6)*, this constant concentration rate is characteristic of hindered settling. He divides the settling of a slurry into two phases, clarification and thickening. In the former phase, settling is free or unhindered, each individual particle or flocculated agglomerate settling according to Stokes' law with no well defined boundary between settling solids and supernatant liquor. In the thickening phase, hindered settling, at a more or less constant rate, takes place, and blanket settling occurs with a well defined boundary between sludge and supernatant. A point or zone is reached in the thickening process following which subsidence proceeds at a much reduced rate. Deane *(6)* refers to this point as the point of compression. Camp *(5)* considers that this point separates hindered settling from compaction. He estimates that the free settling phase in the settling of sewage solids does not extend beyond the range of 1000 ppm suspended solids, and that the compaction of good activated sludge begins at 4000-7000 ppm. The initial concentration and nature of the concentration curves of the sludges studies in this investigation indicate that free settling was not encountered. In accordance with Camp's separation of settling phases, it will be considered that settling took place by hindered settling followed by compaction. The zone between the two phases will be termed the "zone of compression" in accordance with Deane's notation.

Of the hydraulic characteristics affecting settling, side wall area and surface area are probably the most important. Camp *(5)* computed that the side wall effect is negligible if the diameter of the settling particles is less than 1% of the cylinder diameter. Microscopic measurements made of fibre in paperboard sludge indicate the fibre length to range from .045 to 4.5 mms. Since the settling tests were conducted in 500 cc. graduates of diameter 4.70 cm., the fibre lengths ranged from 0.095% to 9.5% of the container diameter. The side wall effect was evaluated in a study to be described hereinafter.

The surface area effect comes into play merely by virtue of the fact that, for a given volume of sludge, the surface area is inversely proportional to depth. Since the subsidence rate is constant, or nearly so, in the hindered settling phase, a given concentration, attainable in this phase, will be reached in less time when the surface area is large: i.e., when the depth is small. This is so because the distance through which the sludge must subside to attain this concentration is less with larger surface area; i.e., lower depth. However, subsidence in the compaction phase, which proceeds at a decidedly reduced rate and is due to the squeezing out of entrained liquid, is proportional to sludge depth. Since sludge depth is greater, the ultimate concentration attained may be greater when the surface area is smaller. Thus Rudolfs and Lacy *(7)* in a study of concentration of activated sludge found that a shallow tank of the same capacity as a deep tank would produce better results for short settling periods, but the trend was reversed for longer settling periods.

In recognition of the variability of concentration rate, Camp *(5)* listed as a precaution to be taken in quiescent settling studies of sludges, that an area equal to the depth of the settling tank is preferable. To take advantage of the beneficial influence of large surface areas in short range settling of sewage he advocated the use of multiple tray type settling tanks.

### Effect of Surface Area and Sidewall Effect

In order to illustrate the effect of the surface area factor and to determine the relative effectiveness of this factor versus that of sidewall effect, 250 cc. portions of Sludges A1, A2 and A3 were allowed to settle quiescently in 250 cc. and 1000 cc. graduates at room temperature, and sludge volume readings were taken up to 72 hours. Since the diameter or surface area of these graduates increases with increasing volume, the sludge depth decreased from the small to the large

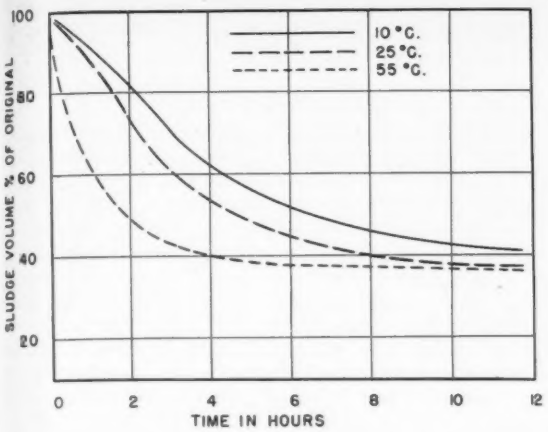


FIG. 9. Effect of temperature on the concentration rate of white water sludge.

graduates in ratios of 1 to 0.57 to 0.37. The variation in subsidence rates measured in the above tests is the result both of surface area or depth and sidewall effect, since the latter varies as the ratio of wetted sidewall

$$\text{area to volume or as } \frac{\frac{D \times H}{2}}{\frac{D}{4} \times H} = \frac{4}{D}$$

Sidewall effect was evaluated separately in a second series of tests in which constant depths of the above sludges were settled in 250 cc., 500 cc. and 1000 cc. graduates. This eliminated the factor of depth. To correlate these results with those of granular sludges, parallel tests were run with a sludge sample obtained by neutralizing oxidized pickle liquor with lime. Fig. 2 illustrates that the concentration rate of a given volume of sludge was greater in the initial stages with settling containers of larger surface area; however, this tendency was ultimately reversed. The initial discrepancy was appreciable, amounting to 40% difference in a sludge volume after two hours' subsidence. The contribution to this discrepancy attributable to sidewall effect is demonstrated in Fig. 3.

Results of a similar nature were obtained with sludges A1 and A2. The differences in sludge volume reductions after two hours of settling of A1, A2 and A3 were:

| Sludge | * Total Diff. | * Difference Due to Sidewall | * Difference Due to Surf. Area—by Diff. |
|---|---|---|---|
| A1 | 28 | 13 | 15 |
| | 31 | 5 | 26 |
| A2 | 5 | 1 | 4 |
| A3 | 40 | 10 | 30 |
| | 39 | 26 | 13 |
| Average | 29 | 11 | 18 |

* Differences between percentage sludge volume reductions—1000 cc. graduate results minus 250 cc. results—for Sludges A1, A2 and A3.

The results show that average total differences of 29% in sludge volume reductions were obtained. Of this this difference 11% was attributable to sidewall effect and 18% to surface area effect. Fig. 4, showing the concentration rates of sludge from the lime neutralization of oxidized pickle liquor, indicates that sidewall affect was practically negligible with this sludge and that surface area effect accounted for any discrepancy.

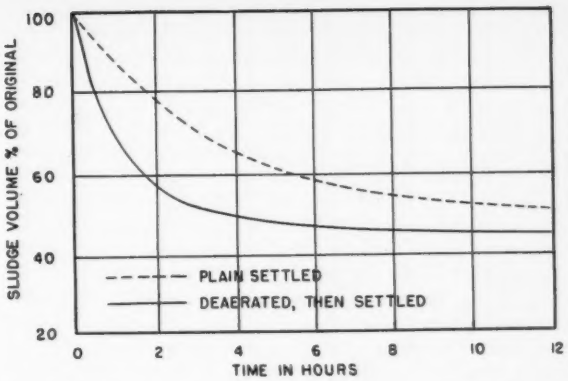


FIG. 10. Effect of deaeration on the concentration of white water sludge.

## Effect of Time

To determine the effect of compacting time on sludge concentration, sludges A4, B2, B3 and C1 were allowed to settle quiescently in 500 cc. graduates at room temperature (20-25°C.). Readings of the sludge volumes were taken at frequent intervals, up to 142 hours. Fig. 5 depicts typical concentration curves up to 12 hours for sludges of approximately the same concentration from mills A, B and C and indicates that most of the concentration took place in 3-4 hours. The variations in concentration rates were appreciable and indicate that sludge nature may be more influential than sludge concentration in determining the concentration rate. The sludge nature varied not only from mill to mill but within samples from a single mill. Fig. 6, in which the concentration rates of three sludges from mill A are shown, illustrates that differences in sludge nature may sometimes be more influential than initial concentration in determining the subsidence rate. Differences in sludge nature were difficult to evaluate; however, initial concentration was controlled and its effect was evaluated in a subsequent series of tests.

The subsidence rates of two sludge samples from mill A are compared with those of the sludge obtained by two hour settling of the corresponding white water in Fig. 7. These curves indicate that the two hour settled sludge, although of slightly lower concentration, has lower subsidence rates than their alum collected counterparts. However, the difference is slight. In all of the curves shown, the transition from the phase of hindered settling to that of compaction is evident. There is a marked reduction in the velocity of subsidence beyond the phase of hindered settling. Depending upon the putrescibility of the sludge, decomposition sets in after 24-48 hours of settling. This affects flotation of the sludge and concentration from below, resulting in a somewhat increased rate of compaction. This has application only in lagooning of sludge for disposal.

## Initial Concentration

Since variation in concentration rate due to initial concentration is obscured when sludges of different sources, and hence different natures, are compared, an individual five gallon sludge sample collected from the sludge return line of the save-all at mill B was selected for this test. This sample was allowed to settle and six 500 cc. samples were siphoned off at various settling times. Each of these samples, therefore, although of different concentration, was dispersed in the same mother liquor. Five hundred cc. portions of each of the

above samples were then allowed to settle quiescently in 500 cc. graduates and sludge volume readings were taken up to 72 hours. This process was twice repeated after returning that portion of the sample previously removed to restore the five gallon sample to its original volume. The initial suspended solids concentration in the 500 cc. samples varied from 2500 to 13,500 ppm. Concentrations throughout the settling period were computed from the initial concentration by assuming an inverse relationship between sludge volume and concentration. This was justifiable inasmuch as a clear supernatant liquor resulted from the settling of this sludge. Fig. 8, showing the concentration rates for sludges of different initial concentrations, illustrates the general relationship observed for 18 conducted tests. The rate of subsidence in the hindered settling phase was greater and the zone of compression was sharper and was encountered sooner with weaker sludges. However, the subsidence rate in the compaction phase was greater in the initially more concentrated sludges.

The suspended solids concentrations throughout the settling periods of the sludges, shown in Fig. 8, were computed from the initial concentrations by assuming an inverse relationship between sludge volume and concentration. These concentrations were then plotted against time. The results indicate that the subsidence rate in the hindered settling phase of the more dilute sludges may be such that at some stage in this phase, depending upon and proportional to the discrepancy between the concentrations, the weaker sludges may attain a concentration which is higher than that of the initially stronger sludges. However, the initial order of concentration is reestablished in the compaction phase.

### Effect of Temperature

To determine the effect of temperature, samples of sludges were settled quiescently at temperatures of 10°C., 20°C., 25°C., 37°C., 50°C., and sludge volume readings were taken as previously indicated. A one hour temperature adjustment period was allowed for each sample before the start of the settling test. Duplicate samples of sludge to which 20 ppm mercuric chloride had been added to preclude bacterial decomposition and subsequent gas production were also set up as an example the effect of temperature on the subsidence rate is shown in Fig. 9 for sludge A4, in which the subsidence rate is plotted with temperature as a parameter. For clarity, the curves for 20° and 37° were omitted from the plot. These curves illustrate that greater subsidence rates were attainable at higher temperatures and that the effect was greatest between 1 and 3 hours' settling time and became less pronounced with increasing settling time. The discrepancy in the sludge volumes at 10°C. and 50°C. amounted to 30% after one hour settling time, whereas other sludges were affected to a lesser degree by temperature variation. Up to 22 hours, there was no evidence of decomposition and, therefore, little discrepancy between the subsidence rates of the samples to which mercuric chloride had been added and those without mercuric chloride.

### Effect of Flocculation

Samples of sludges B1 and B2 were flocculated in a stirring apparatus at 24 rpm for 15 minutes, 30 minutes and one hour and were then allowed to settle quiescently.

The sludge volumes of sludge B1 attained after flocculation compared with the control (Table 3) indicate that this process exerts a negligible effect. Similar results were obtained with sludge B2. These results are similar to those of Rudolfs and Lacy *(7)*, who obtained only a slight advantage in concentration by stirring activated sludge.

### Effect of Deaeration

A sample of sludge was deaerated at room temperature for ten minutes under a vacuum equivalent to 25 inches of mercury. The sample was then remixed, care being taken to avoid reintroduction of air, and its concentration rate compared with a control.

A greater rate of concentration was attained in the deaerated sample, as depicted in Fig. 10, indicating that air and other gases may exert a buoyant effect and impede settling. The advantage of deaeration is incorporated in the Marx save-all for recovery of fibre from white water. However, deaeration is accomplished in this device by non-turbulent flow of the white water over an inverted cone rather than by use of a vacuum.

### Discussion of Results

The concentration by gravity settling of white water sludges was variable and was found in this investigation to depend principally upon the sludge nature and initial concentration. Regardless of these two factors, however, the sludge concentration curves were characterized by a phase of hindered settling in which concentration took place relatively rapidly and a phase of compaction in which concentration took place extremely slowly. Because of this slow rate of compaction of white water sludge, there is little advantage, except for purposes of sludge disposal in lagoons, where very long settling periods are achieved, in attempting to concentrate this ludge beyond the zone of compression. The experiments conducted to determine the effect of time on sludge concentration have indicated that the time of achievement of the zone of compression and the attendant sludge volume reduction vary with the nature of the sludge.

For a sludge of specific nature, however, the zone of compression is reached in less time, is better defined and corresponds to a greater percentage reduction in sludge volume when the sludge is of lower initial concentration. Thus, the zone of compression of 0.30% solids sludge as shown in Fig. 3 and 5 occurred in 2-2½ hours with a sludge volume reduction of 70%, whereas that of 0.85% solids sludge, was attained in 7-8 hours attendant with a sludge volume reduction of only 35%. Since the period in which efficient settling is accomplished and the sludge volume reduction accruing in this period is dependent upon the sludge nature and concentration, the effectiveness of gravity settling on a particular sludge can be determined only by settling tests on that sludge. In such a test, there are two important factors to be considered if experimental results are to be extended to actual operating conditions. These are (a) the effect of depth (or surface area when a given sludge volume is considered) and (b) the effect of sidewall friction. Both of these factors were shown under the conditions of the tests in this investigation to influence the concentration rate of white water sludges. If, however, the sidewall effect is negligible as in the case of granular sludges of small particle size or in the case of white water sludge settled in large containers, then results obtained experimentally with a small depth of sludge can be applied to any depth that may be encountered in practice. This can be done by noting the subsidence rate in terms of cm./sec. rather than the concentration rate in terms of % sludge volume reduction per unit time. The former is constant regardless of the depth whereas the latter

varies inversely with the depth as shown in the foregoing experiments. If it is desired then to determine the time of settling before achievement of the point of compression under operating conditions, this can be computed from (a) the concentration at which the point of compression occurs (known from the experimental test). In cases where the zone of compression is poorly defined, the point of compression can be approximated by drawing lines tangent to the hindered settling and compaction portions of the concentration curve. The intersection of these lines will be approximately the compression point. (b) The depth to which the sludge must settle under operating conditions to attain this concentration. (c) The subsidence rate of the sludge in the hindered settling phase (known from the experimental test).

To preclude the necessity of this exterpolation, Camp *(5)* recommends that a sludge depth equal to that in the settling tank be used in the experimental tests.

Since the tests in this investigation were effected by sidewall friction, the results cannot be extended to operating conditions. Since all sludges were tested under the same conditions and were equally affected by sidewall friction, the results do serve as a basis for comparison of different sludges and the effectiveness of various treatment measures. Under the conditions of the gravity settling tests, the zones of compression occurred after 2 to 5 hours for sludges of initial concentration, ranging from 0.40 to 0.80% solids, the normal range of sludge concentration for 2 hour plain settled and coagulated and 2 hour settled white water; 50% to 80% sludge volume reductions were attained in that time. Sludges having higher solids concentration, concentrated, in general, to a lesser degree and required longer periods to reach the zone of compression. Hindered settling subsidence rates of 0.023 to .026 cm./sec. were recorded in the case of sludge from mill B varying from 2,500 to 3,500 ppm suspended solids concentration. From experiments by Rudolfs and Lacy *(7)*, Camp *(5)* calculated that the hindered settling velocity at room temperature of 2,000 ppm activated sludge is from .080 to .15 cm./sec.

The subsidence rates in the zone of hindered settling are higher for sludges of lower initial concentration. The reverse is true in the zone of compaction. The results of Rudolfs and Lacy *(7)* in a study of initial concentration on the concentration rate of activated sludge indicate the same phenomenon. Thus, it was observed in the tests wherein the sludge nature was controlled that at some stage in the hindered settling period initially weaker sludges may actually attain higher concentrations than initially stronger sludges. This phenomenon is probably the result of settling momentum built up during the early periods in the weak sludges. This momentum is eventually spent and the concentration rate of the initially weaker sludges subsequently slowed so that in the compaction phase, the initial order of concentration is re-established. Therefore, if sludge is to be concentrated by short period settling only, there may be an advantage in beginning with a weaker sludge if sufficient capacity is available to handle the increased volume. Because of decreased specific gravity and viscosity of the settling medium, greater subsidence rates are attained at higher temperatures. Rudolfs and Lacy *(7)* and Rudolfs and Logan *(8)* in studies of activated sludge and fresh solids found the same general relationship to apply. The influence of temperature results in a 30% discrepancy after 1 hour settling time at 10°C. and 50°C. This has

TABLE II.—RELATION BETWEEN WHITE WATER WASTES AND SLUDGES OBTAINED BY TWO-HOUR PLAIN SETTLING AND BY COAGULATION

| | White Water | 2 Hr. Settled Sludge | Alum Coag. Sludge | White Water | 2 Hr. Settled Sludge | Alum Coag. Sludge |
|---|---|---|---|---|---|---|
| Solids, % | 0.13 | 0.40 | 0.45 | 0.16 | 0.73 | 0.80 |
| Ash, % | 32 | 20 | 21 | 29 | 21 | 25 |
| Sus. solids, p.p.m. | 340 | 2940 | 3440 | 320 | 6000 | 6420 |
| Ash, % | 18 | 16 | 17 | 12 | 14 | 25 |
| pH | 7.0 | 6.9 | 6.3 | 6.3 | 6.1 | 6.1 |
| Alkalinity, p.p.m. | .... | 112 | 90 | 220 | .... | 220 |
| Acidity, p.p.m. | .... | ... | 25 | 55 | .... | 170 |

definite application to white water sludge since white water frequently leaves the mill at a temperature between 50-60°C.

The buoyant effect of gases coming out of solution because of temperature increases or supersaturation of the gases of decomposition may impede settling. It is impractical to remove these gases by application of a vacuum; however, it may be possible to remove them by means such as that employed in the Marx save-all.

## Summary


The possible effect of certain sludge characteristics, time of settling, initial concentration of sludge, temperature, flocculation and deaeration of sludge, and the effect of surface area and sidewalls, on the thickening of paper mill white water were studied. It was found that:

1. In general, white water sludge will concentrate at relatively low rates more slowly than activated sludge of the same solids concentrated; the effectiveness of gravity settling depends principally on the sludge nature and initial concentration;

2. For a sludge of specific nature, subsidence in the hindered settling phase is more rapid with sludges of lower initial concentration, so that the zone of compression is attained in less time, is better defined and is accompanied by a greater sludge volume reduction than with sludges of initially higher concentration. This implies, apart from the obvious fact that gravity settling is more effective with sludges of lower initial concentration, that for purposes of reuse of sludge or disposal by means other than by lagooning, the period of efficient concentration by settling is shorter for sludges of lower initial concentration;

3. Greater subsidence velocities are achieved at higher sludge temperatures because of a decrease in viscosity and specific gravity of the settling medium. In order to preserve high sludge temperatures, frequent sludge removals are preferable in cases where the white water is treated by sedimentation;

4. The sludge solids concentration attained at some stage in the hindered settling phase may be greater in the case of sludge of initially lower concentration. This indicates also the feasibility of frequent sludge removal from white water treatment units.

5. The buoy-effect of gases coming out of solution impedes settling by attachment of gas bubbles to sludge particles. In sludges removed at high temperatures from white water treatment units, this effect is at a minimum, since the tendency is toward lower temperatures; i.e., greater solubility of dissolved gases;

6. The volume of sludge can be readily decreased in 3-6 hours to 25-40% of the original by gravity settling


TABLE III.—THE EFFECT OF FLOCCULATION ON THE SUBSIDENCE RATE OF SLUDGE B1

| Settling Time, Hr. | Flocculation Time ¼ Hr. | ½ Hr. | 1 Hr. | 0 Hr. (Control) |
|---|---|---|---|---|
| 0 | 100 | 100 | 100 | 100 |
| 0.5 | 98 | 97 | 98 | 99 |
| 1 | 96 | 95 | 97 | 97 |
| 3 | 91 | 92 | 91 | 93 |
| 7 | 88 | 87 | 87 | 88 |
| 32 | 83 | 87 | 85 | 85 |

Figures represent sludge volume—per cent of original.

or flotation, depending upon the initial concentration; further compaction is primarily a function of time and temperature.


### Acknowledgment

The work reported was performed under a Research Grant of the National Council for Stream Improvement of the Paper, Pulp and Paperboard Industries.


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# NEW LITERATURE

## Profitable Inventory Control Studied

*How to Get Profits from Inventories* is both the title and the content of a new 24 page illustrated booklet published by the Systems Division of Remington Rand Inc. The booklet quickly gets to the heart of this timely question of profitable inventory control. It pictures and describes the most modern methods of simplifying the management of stocks to prevent losses either from too much or too little and shows why and how improved, modern inventory records reduce clerical costs and conserve executive time.

Subjects discussed are: how to balance supplies of each item against demand for it; how to determine most profitable turnover rates for individual items; how to avoid unseen inventory losses that follow averaging of turnover rates; how to determine trends and anticipate changes in demand for stock items; how to avoid needless clerical and record work in controlling stock; how to eliminate needless forms and simplify the requisitioning of needed items without writing individual purchase requisitions; how to save errors by eliminating calculations through the *Chart-That-Thinks;* and how to cut the costs of buying, owning, warehousing, and disbursing stocks.

Copies of this free 24 page booklet on inventory control may be obtained from any office of Remington Rand or by writing to J. A. Grundy, Manager, Systems and Methods Research Department, Remington Rand Inc., 315 Fourth Avenue, New York 10, N. Y.

## Thew Describes Lorain Logging and Equipment

"Modern Logging With Lorains," an illustrated booklet depicting the widespread use of Lorain equipment in the logging and lumber industries, has just been published by The Thew Shovel Company of Lorain, Ohio.

Containing a wide range of illustrations, the publication describes the efficiency of power cranes and shovels in all operations from timberland to lumber mill. It pictures the employment of Lorain equipment in building logging haul roads, loading logs, skidding and decking, plus the handling of a multiplicity of jobs at the mill. Another feature of the booklet is the illustrated story of how Lorain Moto Crane mobility serves selective logging. The correct handling of pulpwood as a means of obtaining greater production, lower costs and fewer accidents is pictured in detail, as is the efficiency with which Lorains handle finished lumber at the mill or in the dealer's yard.

The booklet also covers the various sizes and lifting capacities of Lorain machines and illustrates the three types of mountings on which the units are built — 2-speed crawler mountings, 2-engine rubber-tire mountings, and single engine rubber-time mountings.

## GDC Bulletins Preventol For Paper Industry

Under the designations *Preventol GD—Preventol GDC Liquid in the Paper Trade,* General Dyestuff Corporation, 435 Hudson Street, New York 14, N. Y., has released its new circular GDC 292 which describes its new type of disinfectant to the paper industry.

Recommended for controlling the growth of fungi and bacteria in pulp, paper and paperboard mills, Preventol GD and Preventol GDC Liquid are considered, because of their non-toxic properties, to be of special interest to mills making papers or paperboards which come in contact with foods. It is claimed that these products have inhibited slime formations in systems containing among other things such excellent bacterial nutrients as starch and casein. Their use also is suggested in groundwood pulp mills since they will not break down at the high temperatures encountered in grinder pits, and in paperboard mills wherein stock is generally beaten in hot water or with the introduction of steam.

Bulletin 292 treats with the method of application for slime control in paper mill water and stock systems, also with immunization of paper mill felts against attack by bacteria and mildew-causing fungi. A section is devoted to Results of Practical Trials in slime control, pulp preservations and felt treatment. Copies available upon request.

## Dow Chemical Describes Ethocel Hotmelts

A Technical Service Bulletin entitled "Ethocel Hotmelts for Paper Coating" has recently been released by Dow Chemical Company. The booklet contains description of these hotmelts, how they are applied and the properties obtained when used on papers.

Available at Dow offices throughout the country or by writing to Coatings Section, Plastics Division, Dow Chemical Company, Midland, Michigan.

## Chrome Nickel Steel Book in Second Edition

A book, "Forming of Austenitic Chromium-Nickel Stainless Steels," compiled to give fabricators of metal equipment a better understanding of the exceptional adaptability of stainless steels to all modern processes of forming is now being reprinted. This book presents a detailed description of modern forming procedures as applied to chromium-nickel stainless steels and as practiced in the fabrication plants of the United States. Bending and straight flanging; forming of curved sections and tubing; deep drawing; die forming; forming of contoured-flanged parts, and forming by miscellaneous methods are some of the methods discussed in the book.

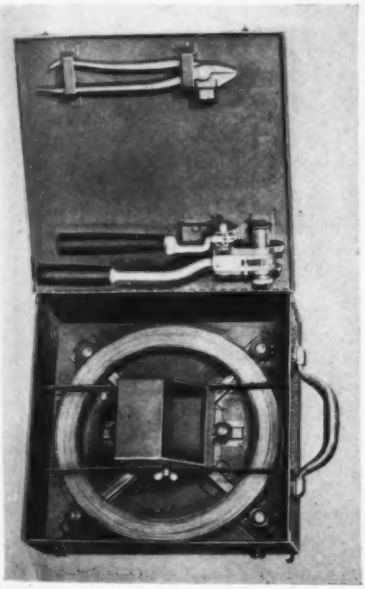
Specific examples of forming technique are supplemented by details of tool design and tool materials, lubricants, data on dimensions, and consecutive steps in fabrication.

The second printing is to be ready before May 15, and will be available only through International Nickel. Copies, as long as they are available, may be reserved in the United States by mailing checks of $4.00 for each copy to The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y., and in Canada by addressing The International Nickel Company of Canada, Limited, 25 King Street West, Toronto 1, Ontario.

# EQUIPMENT AND SUPPLIES

## Portable Dispensing Kit Carries Tools and Strap

Complete steelbinder strapping equipment packed in a light-weight steel kit called the *Strap Kit* is produced by A. J. Gerrard & Company. Carried like a small brief case, the *Strap Kit* contains a steelbinder strapping tool and cutter, and can carry enough coiled strapping and seals to handle several jobs without a refill. The strapping is unreeled through a small slit in one end of the steel case, a feature particularly attractive to outdoor workers.



First unit of its kind, the *Strap Kit* provides a practical and economical means of carrying strapping equipment to out-of-way points of use. It eliminates wasteful "estimates" on the amount of strapping needed for such work by dispensing at the point of use exactly the length of strap required.

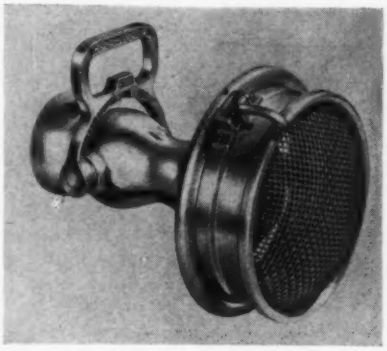
Built to stand knock-about usage, the *Strap Kit* provides a light, compact unit for transporting and dispensing strapping of steel and other metals.

Size is 14 inches high, 12 inches wide, and 5 inches thick. Finished in stippled battleship gray and fitted with a handle. A. J. Gerrard & Co., 221 North LaSalle Street, Chicago 1, invites inquiries.

## Rockwood's Fog-Foam Nozzle Extinguishes Liquid Fires

Now available for the first time to industrial plants, municipal fire departments, oil refineries, et cetera, is Rockwood's Type FFF Fogfoam Nozzle, the new development for extinguishing flammable liquid fires.

Originally developed by the Rockwood Sprinkler Company to protect naval aircraft carriers from the devastating attacks of Jap suicide bombers, this latest advancement is considered a fitting running mate for the Rockwood Water Fog Nozzles. It is claimed that



the Type FFF Fog Foam Nozzle provides for greater fire fighting extinguishing action than has ever been possible with the old style chemical or mechanical foam equipment.

Type FFF—so named because it will provide any one of three different discharges, Fog Foam, Solid Foam Stream or Waterfog—is available for services on 1½, 2½ or 3½ inch hose.

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For literature write to Rockwood Sprinkler Company, 54 Harlow Street, Worcester 5, Mass.

## New Clear-Flo Starch Marketed By National

A new type of starch, which swells at considerably lower temperatures than ordinary starches, gives clear, stable, and unusually viscous pastes, has been marketed by National Starch Products, Inc., under the name *Clear Flo*.

Available in both high and low viscosity grades, Clear Flo starches are easily prepared by merely adding hot water to a suspension of the starch in cold water. The pastes obtained range from opaque to clear depending upon the temperature of the water used. The unusually high water-taking ability of Clear Flo starches permits considerable dilution with but slight loss of body.

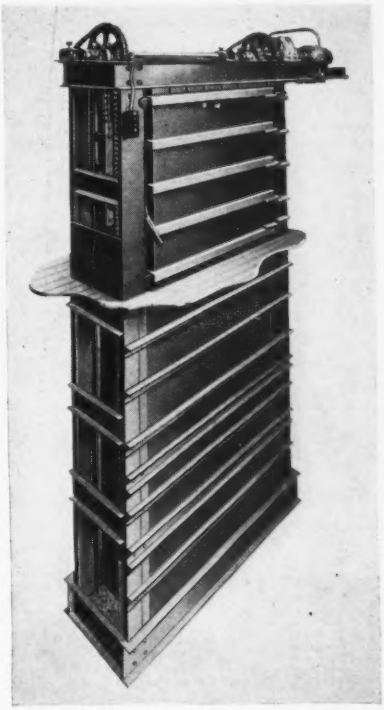
According to Dr. Caldwell, National's Coordinator of Research, the unusual clarity, stability, high viscosity and ease of preparation of the Clear Flo starches suggests their application for a wide range of industrial uses, such a paper sizing ingredient, as a desensitizing gum in lithography, et cetera. The similarity of many of the properties of the Clear Flo starches to those of carboxymethyl cellulose suggests many other uses.

Research samples of the Clear Flo starches can be obtained from National Starch Products, Inc., 270 Madison Avenue, New York 16, N. Y.

## Buffalo's Pit Baler Distributed By Loeser

The new upstroke electric pit baler of the Buffalo Baler Company is distributed exclusively through E. W. Loeser Company, 1352 Genesee Street, Buffalo 11, N. Y., from whom descriptive literature is available.

Series 200 is built with a ten-foot chamber beneath the floor. Material to be baled is merely pushed or thrown into the chamber, thus eliminating the necessity of any lifting on the part of the operator. All standard models are constructed with sliding roller top so that filling may be made from an upper floor if desired. The lower platform leaves the finished bale at just the right height for removal to a hand truck. Standard bale heights are 54 inches, 60, 66 and 72 inches.



Buffalo Pit Baler Series 200 showing full view of chambers above and below floor.

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# Biological Treatment of Deinking Waste*

By Philip F. Morgan[1]

## Abstract

*The paper industries' deinking waste presents a serious pollution problem in many streams into which it is discharged because of the large amount of suspended solids carried in the waste and because of the high Biochemical Oxygen Demand (B.O.D.) of the liquid fraction of the waste. Because the greatest proportion of the B.O.D. is in solution, conventional sedimentation or chemical coagulation and sedimentation treatment methods have not proved adequate.*

*A method of biologically treating this waste was worked out in the laboratory which is sponsored by the National Council for Stream Improvement at Kalamazoo, Michigan. The paper summarizes the procedure used in the development work and presents typical data showing results obtained. All reported work was carried on in 1-gallon tanks so pilot plant work will be necessary before cost-of-treating figures can be obtained and before methods of disposal or utilization of the by product sludges can be worked out.*

*The work shows that relatively high B.O.D. reductions can be obtained under laboratory conditions and indicates that this method of treatment may be applicable for the deinking waste so the treated waste can be discharged to rivers or streams without creating a public nuisance.*

The National Council for Stream Improvement established the project at Kalamazoo, Michigan for the purpose of continuing studies on methods of economically treating deinking waste so this waste could be discharged into receiving streams without creating a serious pollution problem.

The Council's earlier work at Mellon Institute *(1)* included exploratory laboratory investigations of all known methods of physically and chemically treating the waste to reduce its pollutional characteristics. These studies included plain settling of the waste, heat coagulation, centrifugal separation, filtration, and chemical coagulation using aluminum chloride, activated silica, sulphur dioxide, carbon dioxide, lime, ferric chloride, monochloroacetic acid, ferrous sulphate, and many combinations of these. The results of these investigations, which covered a period of about a year and a half, indicated that clarification of the waste could be obtained by chemical means but that it would be expensive and only about 20% of the total organic material (as measured by the Biochemical Oxygen Demand test) would be removed. Therefore, it was indicated that biological treatment might be necessary for greater removal of the organic material.

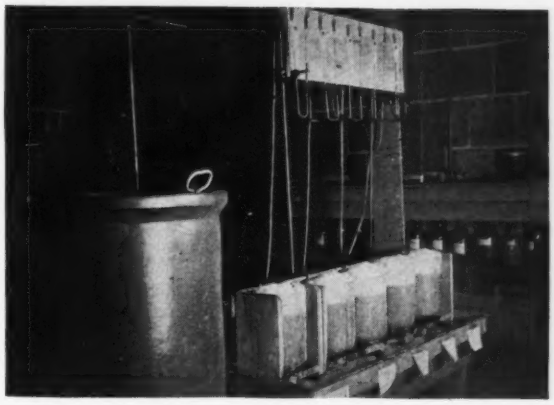

FIG. 1
Laboratory Aeration Tanks

It appeared advisable at this time to expand the project to include studies at a location close to the deinking mills where it would be possible to study the effect of the waste on the receiving stream where adequate waste would be available for experimental and pilot plant work and where the waste problem could be studied in connection with mill production processes. The laboratory was established at Kalamazoo College in the summer of 1945 and work on the development of a biological treatment process was started in the laboratory as soon as possible after work on the stream survey and mill production phases of the project were well under way. This paper covers the laboratory development of the biological treatment process.

## Deinking Waste

Deinking waste varies in quality and quantity depending upon the type of paper being deinked and the deinking process used, but the general characteristics are similar so that a process developed with deinking waste from one mill should be applicable to all mills.

The earlier work *(1, 2)* had indicated that the suspended solids of typical deinking wastes varied from 570 to 3072 p.p.m. with 30 to 42% of these solids being

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 23-26, 1948.

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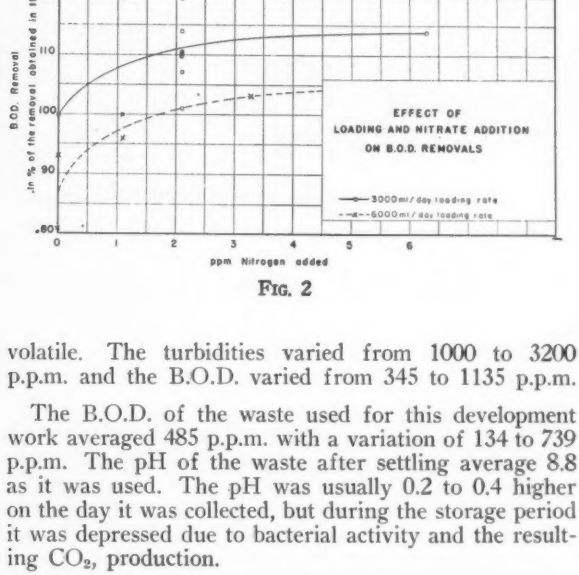


FIG. 2

volatile. The turbidities varied from 1000 to 3200 p.p.m. and the B.O.D. varied from 345 to 1135 p.p.m.

The B.O.D. of the waste used for this development work averaged 485 p.p.m. with a variation of 134 to 739 p.p.m. The pH of the waste after settling average 8.8 as it was used. The pH was usually 0.2 to 0.4 higher on the day it was collected, but during the storage period it was depressed due to bacterial activity and the resulting $CO_2$, production.

The development of a biological treatment process for deinking waste was considered feasible as the waste did not show any toxic tendencies at any dilutions used in the B.O.D. test

## Procedure

All development work was carried on in the Council's laboratories at Kalamazoo College, with equipment shown in Fig. 1. The aeration tanks were stoppered 1-gallon glass bottles set in an inverted position with the bottoms cut out. These provided a round bottom that eliminated corners where the biological life could settle and become septic. Each tank had a capacity of 3000 ml. with adequate allowance for freeboard to prevent excessive foam losses. Air was diffused into each tank near the bottom through standard 1-inch carborundum air diffusers and was individually measured with calibrated short tube orifices. An air flow of 0.12 to 0.13 cubic feet per minute per tank was used throughout the period of the experimental work to insure an excess of dissolved oxygen at all times so the quantity of air would not be a factor in interpreting the data.

Raw waste was collected twice a week, brought into the laboratory in 5-gallon bottles, settled for 1 hour, then the settled waste was siphoned into a 15-gallon crock for storage until it was used. The 5-gallon bottles and the storage crock were cleaned between each filling to prevent development of biological life which might materially effect the strength of the waste during the storage period. The aeration tanks were operated continuously from the time they were started in April 1946 until the work was completed 1 year later. During the greater part of this period the loading rate was held constant at 3000 ml. per day except Sunday. At this rate the air was shut off each morning and afternoon for 1 hour starting at 8 A.M. and 4:30 P.M. At the end of the hour settling period the supernatent liquor was siphoned off to the 1500 ml. level, 1500 ml. of settled waste was added to again fill the tank and aeration was resumed. Nutrient salts, when used, were added just after the fresh waste. When higher loading rates were used, an additional feeding was provided at midnight and the waste was added in three equal increments. On Sundays the tanks received only a single normal feeding.

A sample of 100 ml. of mixed liquor which was withdrawn from each tank every morning for the settleable and suspended solids determinations provided a daily wasting of excess solids from the aeration tank. Additional quantities of mixed liquor were wasted as shown on the daily data sheets whenever the suspended solids of the mixed liquor exceeded the desired quantity.

## Analytical Methods and Computations

All B.O.D. determinations were made in accordance with standard methods *(3)* using the standard water seeded with ½% fresh settled sanitary sewage. Dissolved oxygen was determined by the Winkler method using the sodium azide modification.

The pH was determined with a Beckman, Model G pH meter and turbidity with a Jackson turbidimeter. Filter paper in a Buechner funnel was used for making the suspended solids determination of the mixed liquor. Suspended solids of the raw and settled waste and of the final effluent were determined by the Gooch crucible method previous to August 21 but were discontinued after that date because the results were not satisfactory. It is practically impossible to filter deinking waste through a Gooch crucible because of the large amount of clay in combination with the organic material. The clay either clogs the Gooch so the filtrate cannot pass through or, if the Gooch is made with a porous mat, the clay goes through with the filtrate. Since the success of the aeration experiments depended almost entirely upon the B.O.D. removals and not upon the solids removals the development of a satisfactory suspended solids procedure was temporarily postponed.

## Results

Three tanks were first started April 17 and were fed only once a day with 1000 ml. of raw deinking waste. One tank was seeded with 25% settled sanitary sewage, the second tank was seeded with 25% water drained from rich bottom land mud, and the third one did not receive any seeding material but was diluted 25% with tap water. After one week of operation it became apparent that it would be impractical to develop a biological life with the raw waste because of the excessive quantities of settleable solids which accumulated as a sludge. Operation of the three tanks was therefore continued with settled waste.

After 3 weeks' operation with the low feeding rate of only 1000 ml. per day per tank, B.O.D. checks of the effluent indicated that 60 to 70% of the B.O.D. had been removed and that there was no appreciable difference in the removals from the tanks seeded and from the tank that was not seeded. The relatively long aeration period existing with this low rate of feeding would not be economical on a commercial scale, but this work had indicated that the deinking waste would be amenable to biological treatment and that further work would be justified to attempt to increase the efficiency of treatment to the point where it would be practical.

### pH Control of Mixed Liquor

The possibility of improving the efficiency of the biological process by controlling the pH of the mixed liquor in the aeration tanks was investigated during June. The pH of the mixed liquor in the aeration tanks receiving twice daily additions of settled waste averaged

8.6 to 9.0. Since this is considerably above the range of 7.2 to 7.8 which is usually considered necessary for biological waste treatment, the need for pH control appeared advisable.

The use of $CO_2$ was first considered, as stack gas would be a practical source in any mill. It was necessary to add the gas continuously throughout the aeration period to maintain the desired pH. During the period June 2 to June 21 the pH of the mixed liquor was held to an average of 7.7. Several times during this period there were temporary elevations in pH because of failure of the $CO_2$ supply, but in general the pH was held continuously at this lower level.

There was no definite improvement in the quality of the effluent with the $CO_2$ control during this period. The use of $CO_2$ was continued until July 4, but was then discontinued as there was still no improvement.

When the $CO_2$ application was started before the first of June there was some trouble in maintaining a constant flow of the gas; consequently there was a considerable fluctuation in the pH. It was thought that $H_2SO_4$ would be easier to handle in the laboratory and could be used to control the pH, as a check on possible treatment efficiencies that could be obtained with the mixed liquor pH held near the neutral point. During the period June 5 to June 21, $N/5$ acid was added directly to the mixed liquor twice a day to reduce its pH to approximately 7.4. It was found that the pH of the mixed liquor increased to its original value shortly after the addition of the acid due to the displacement of the liberated $CO_2$ by the air being diffused into the mixed liquor. After June 20 all waste used in this tank was pretreated with $H_2SO_4$ to a pH of 7.2 to 7.6 while under active aeration. This pretreated waste was then used to feed the aeration tanks. This method was successful in controlling the pH within the range 7.2 to 8.2 but the quantity of acid required was excessive. Furthermore there was no apparent improvement in the B.O.D. removals by the use of this quantity of acid so the use of $H_2SO_4$ for controlling the pH was discontinued after June 21.

### Ferric Chloride Control

Ferric chloride has been used successfully to control the biological growth in treating sanitary sewage alone and in combination with certain industrial wastes. It was decided to try this coagulant in one of the aeration tanks in the hopes that it might aid in clarifying the final effluent and consequently improve the overall treatment efficiency. From June 22 to August 4 ferric chloride was added each time settled waste was added. Until July 3 it was added at a rate sufficient to provide 5 p.p.m. of iron based on the volume of settled waste added. After July 3 the application rate was increased to provide 20 p.p.m. of iron. The loading rate, aeration rate, etc. were all held the same as for the control tank.

The addition of the ferric chloride did not improve the clarification of the final effluent and did not improve the B.O.D. removals; in fact, there was a definite deterioration in the effluent quality. The use of ferric chloride was discontinued after August 4.

### Mineral Nutrient Additions

The growth of bacteria responsible for the biochemical oxidation process of waste treatment requires certain necessary chemical elements such as nitrogen, potash, phosphorous, iron, and others as well as organic material. If any necessary chemical element is absent or present in insufficient quantities in the waste under

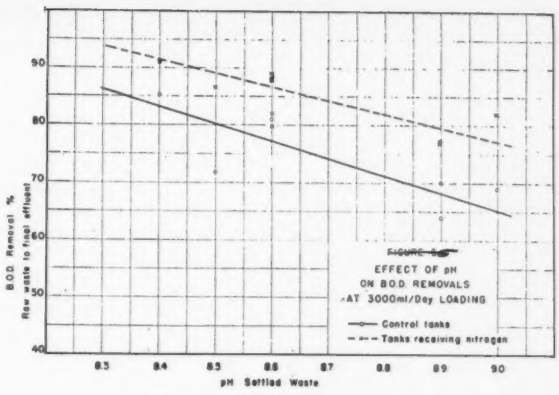


FIG. 3

treatment, the bacterial growth may be retarded or restricted so as to interfere with the normal biochemical oxidation treatment rates.

The B.O.D. dilution water established as the standard water in the Ninth Edition of *Standard Methods (4)* has been designed to provide all necessary elements which might be essential for normal biological growth and oxidation of organic material in the B.O.D. test. If any necessary elements were not present in adequate quantities for optimum biological activity in the treatment process under study, the use of the B.O.D. dilution water nutrients should provide the necessary element to make up the deficit. Accordingly, the addition of *Standard Methods* B.O.D. nutrient salts was started during the last week in June. The nutrients were added so that the concentrations of the salts in the waste would be about five times the concentration available in B.O.D. dilution water. This concentration was arbitrarily selected after considering the relative concentration of

TABLE I.—SUMMARY DATA JANUARY 16 TO FEBRUARY 24

| | Control Tanks No Nutrient Salts | | | Nitrate | |
|---|---|---|---|---|---|
| | | | | Tank D 12.5 p.p.m. $NaNO_3$ | Tank E 6.2 p.p.m. $NaNO_3$ |
| | Tank A | Tank B | Tank C | | |
| Loading rate, ml./day | 3000 | 4500 | 6000 | 3000 | 6000 |
| Raw waste B.O.D., p.p.m. | 589 | 589 | 589 | 589 | 589 |
| Settled waste | | | | | |
| pH | 8.9 | 8.9 | 8.9 | 8.9 | 8.9 |
| B.O.D. | 489 | 489 | 489 | 489 | 489 |
| Mixed liquor | | | | | |
| pH | 9.0 | 9.0 | 8.9 | 9.0 | 8.9 |
| Settleable solids, 30 minutes, % | 19.3 | 19.2 | 17.8 | 15.1 | 15.4 |
| Suspended solids, p.p.m. | 3793 | 3602 | 3513 | 3859 | 4079 |
| Effluent | | | | | |
| Turbidity, p.p.m. | 1544 | 1613 | 1713 | 1434 | 1528 |
| B.O.D., p.p.m. | 180 | 212 | 268 | 137 | 191 |
| B.O.D. removal, % * | 70 | 65 | 56 | 77 | 67 |

SUMMARY DATA NOVEMBER 3 TO NOVEMBER 26

| | Control Tanks No Nutrient Salts | | Nitrate Tank C, 12.5 p.p.m. $NaNO_3$ | Nitrate-Phosphate Tank D, 73 p.p.m. $H_3PO_4$, 12.5 p.p.m. $NaNO_3$ |
|---|---|---|---|---|
| | Tank A | Tank B | | |
| Loading rate, ml./day | 3000 | 3000 | 3000 | 3000 |
| Raw waste B.O.D., p.p.m. | 366 | 366 | 366 | 366 |
| Settled waste | | | | |
| pH | 8.6 | 8.6 | 8.6 | 8.6 |
| B.O.D. | 278 | 278 | 278 | 278 |
| Mixed liquor | | | | |
| pH | 8.8 | 8.8 | 8.8 | 8.8 |
| Settleable solids, 30 minutes, % | 19.8 | 22.0 | 12.9 | 10.0 |
| Suspended solids, p.p.m. | 3155 | 3010 | 2734 | 3510 |
| Effluent | | | | |
| Turbidity, p.p.m. | 735 | 761 | 806 | 550 |
| B.O.D., p.p.m. | 67 | 84 | 50 | 37 |
| B.O.D. removal, % * | 83 | 79 | 87 | 91 |

* This per cent is the average of daily per cent removals and may not check per cent removal computed from average B.O.D.

organic material and the proportionate completion of the oxidation process in the B.O.D. dilutions and in the aeration tanks.

The early work indicated that the B.O.D. removals could be improved about 10% by the addition of these nutrients. A continuation of the work using various combinations of the nutrient salts indicated that the calcium chloride, magnesium sulphate, ferric chloride, sodium hydroxide, and potassium phosphate were not responsible for the improvement in the B.O.D. removals. Ammonium sulphate when used alone provided the same improvement as all of the salts combined. Further work showed that sodium nitrate was equally as effective as the ammonium sulphate when the quantities used provided equal amounts of nitrogen. It thus appeared that the addition of a nitrogen salt was responsible for the improved operation with the nutrient salts and that the waste must be somewhat deficient in available nitrogen for maximum biological activity.

Summary performance data from two periods of operation with the mineral nutrients are presented in Table I. Lack of space prevents the presentation of more data, but those shown are typical. (Complete data for the years' study will be available in the National Council for Stream Improvement Technical Bulletin). The low B.O.D. removal by plain settling of the waste, the relatively high overall B.O.D. removals for this strength waste, the high pH of the mixed liquor, the low 30 minute settleable solids volume, and the relatively high turbidity of the final effluent are typical of the process.

The comparison of the B.O.D. removals and characteristics of the sludge developed with and without the addition of a nitrogen salt are summarized in Table II.

TABLE II.—EFFECTS OF ADDING NITROGEN TO WASTE AT 3000 ML./DAY LOADING

| Average Results July 1, 1946-Mar. 17, 1947 | Mixed Liquor: Settleable Solids % | Mixed Liquor: Suspended Solids p.p.m. | Mixed Liquor: S.V.I. ml.* | B.O.D. Removal: Raw to Settled % | B.O.D. Removal: Raw to Final % |
|---|---|---|---|---|---|
| Control tanks, no nitrogen.. | 20.9 | 2935 | 79.1 | 17.2 | 74.9 |
| Tanks receiving 1.0 p.p.m. or more of nitrogen ..... | 11.6 | 2982 | 39.0 | 17.2 | 84.1 |

* S.V.I. = Sludge Volume Index = Volume occupied by 1 gram of the sludge after settling the mixed liquor 30 minutes.

These data indicate that the addition of small quantities of nitrogen increased the average B.O.D. removals from 74.9 to 84.1% and resulted in the development of a more compact sludge which would be easier to control and to dewater in a full scale plant.

The minimum quantity of nitrogen necessary and the effect of increased loading rates both with and without nitrogen additions were investigated in a series of accelerated loading studies. The data obtained are presented in graphic form, Fig. 2 Here again the value of the nitrate addition is clearly indicated and it appears that there is little gain in adding more than 2.1 p.p.m. of nitrogen. The data available for indicating the value of nitrate additions of more than 2.1 p.p.m. are limited, but since the 3000 ml./day and the 6000 ml./day loading curves both indicate little improvement for more than 2.1 p.p.m. the curves can be considered indicative. The quantity of 2.1 p.p.m. of nitrogen or 12.7 p.p.m. $NaNO_3$ can be considered the optimum quantity necessary for maximum B.O.D. removals.

The overall B.O.D. removals of the control tanks varied considerably from period to period for the same rate of waste loading, the same strength raw waste and the same concentration of solids in the mixed liquor. An inspection of the data indicated that this variation was apparently associated with the variation of the pH of the settled waste. This correlation is shown in Fig. 3 which indicates a gradual reduction in the B.O.D. removals as the pH of the settled waste increased from 8.4 to 9.0. In examining this chart it must be remembered that the pH of the waste as collected at the mill was 0.2 to 0.4 higher than the values shown.

## Application of Process to Treatment Plant

The aerobic biological process of aerating waste for several hours and of then allowing the biological life to settle, followed by withdrawal of the supernatent liquor, the addition of new waste, and the resumption of aeration; and the periodic wasting of excess biological life is known as the activated sludge process when it is applied to domestic sewage. The process which has been used for the deinking waste is actually an adaptation of the activated sludge process, but it differs so greatly in the pH of the mixed liquor, the physical characteristics of the sludge, the settling characteristics of the sludge and the appearance of the final effluent that except for the flow diagram, the operation is not characteristic of the activated sludge process. For this reason the general term biological treatment of the waste has been used in this work in preference to the more confining term, activated sludge.

When applied to a full scale installation at a mill this process would be carried on as follows: The waste from the deinking process would first receive primary treatment to remove the settleable material. This treatment would take place in a simple sedimentation tank operating on a continuous flow basis with a detention period of 1 hour, and with provision for withdrawing the settled sludge at regular intervals. The settled waste would then receive secondary treatment in an aeration tank having sufficient size to provide the necessary detention period. From there it would flow into the final settling tank and from there to the river. The organic life which had developed in the aeration tank, would settle to the bottom of the final settling tank and would be continuously pumped back to the inlet end of the aeration tank. This returned secondary sludge is necessary to maintain the concentration of organc life needed in the aeration tank. As treatment progresses excessive quantities of this organic life or secondary sludge would be wasted at regular intervals.

The disposal or utilization of the primary and secondary sludge is a problem which must be solved before this process can be applied to a full scale installation, but it is not practical to work on this phase of the project until larger quantities of these sludges are available for experimental work. A continuously operating pilot plant would be necessary for this purpose.

The question of the aeration period required will also need to be investigated further, as it determines the size of the aeration tank required for any given waste flow. Allowing for a return sludge flow of 25% of the settled waste volume, the aeration tanks receiving 3000 ml. of waste per day had an average aeration period of 19 hours. The aeration tanks receiving 6000 ml. of waste per day had an aeration period of only 9.5 hours. Considering the very small difference in B.O.D. removals, for the difference in the aeration period, the shorter period is obviously preferable. A continuation of this study in a pilot plant may indicate the practibility of further shortening the aeration period, thereby reducing the size of the aeration tank and the quantity of compressed air needed.

## Conclusion

A series of 1-gallon aeration tanks were operated over a period of a year to determine the practicability of treating deinking waste by biological methods to reduce its Biochemical Oxygen Demand (B.O.D.) to acceptable limits for discharge to streams or rivers.

A biological treatment method which is an adaptation of the activiated sludge method of treating domestic sewage was developed which appears to be practical for deinking waste. Overall B.O.D. removals, raw waste to settled effluent, of 64 to 80% were obtained at an aeration period of 19 hours without the addition of any nutrient salt. The addition of 12.5 p.p.m. of sodium nitrate (2.1 p.p.m. of N) to the settled waste increased the overall B.O.D. removals to 77 to 91% at the same aeration period.

At aeration periods of 9.5 hours and without nutrient salts, average B.O.D. removals of 55 to 70% can be expected. With the addition of 12.5 p.p.m. of sodium nitrate, removals of 64 to 80% can be expected.

The addition of 12.5 p.p.m. of sodium nitrate appears to be justified because of the increase in the B.O.D. removals obtained and because it results in the development of a more compact sludge. The addition of greater quantities of sodium nitrate apparently has little further effect on treatment efficiencies.

The addition of other mineral nutrients similar to these used in B.O.D. dilution water, did not improve the B.O.D. removals. The attempt to improve the B.O.D. removals by controlling the pH of the settled waste and of the mixed liquor with $CO_2$ and $H_2SO_4$ did not prove satisfactory.

The data fail to show any correlation between the strength of the raw waste and the per cent B.O.D. removal, but do indicate a gradual reduction of the quality of the effluent as the pH of the settled waste increased from 8.4 to 9.0.

The process as developed appears to be practical. Pilot plant work has been carried on to obtain data on the effectiveness of treatment and the economics of the process when applied to a continuous flowing-through plant.

The problem of how to utilize or dispose of the by-products of the process, the primary and secondary sludges, was held in abeyance until sufficient quantities of these sludges would be available for development work. This work has gone forward as part of the pilot plant project.


## Acknowledgments

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The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

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# The Solubility of Sulphur Dioxide in Calcium Bisulphite Solutions*

By C. K. White, Jr.[1], J. E. Vivian[2], and Roy P. Whitney[3]

**Abstract**

*Results are presented on the solubility of sulphur dioxide in calcium bisulphite solutions, in the two-phase (gas and liquid) region. Sulphur dioxide pressures up to approximately one atmosphere, combined sulphur dioxide concentrations from 0 to 2.1 grams per 100 grams of water, and temperatures of 10, 18, and 25° C. were investigated.*

In spite of the fact that the sulphite process for chemical pulping has been in commercial operation for over sixty years, comparatively little attention has been paid to the preparation of the cooking acid. The methods of preparation currently in use have been developed in a manner largely empirical and, in some cases, have been seriously limited because of the lack of appreciation of the fundamental factors involved.

The operation of cooking acid preparation is principally one of absorption. Gaseous sulphur dioxide is absorbed either in milk of lime, or in water in the presence of solid calcium carbonate. In either case, the raw acid so produced is then fortified by further absorption, utilizing gaseous sulphur dioxide (in comparatively high concentration) recovered from the digestion process. A sound consideration of the acid preparation system must be based largely upon two considerations: (1) a knowledge of the equilibrium solubility of sulphur dioxide in the solutions, and (2) a knowledge of the absorption rate and the factors which control it. It is the object of this report to present experimental data on the solubility of sulphur dioxide in calcium-base cooking acids in the two-phase (gas and liquid) region—i.e., with no solid phase present.

Several investigators have reported upon the solubility relationships in this system. Enkell *(6)* studied the two-phase region, but his interest was primarily in pulping, and the temperatures investigated were considerably above those of interest in acid preparation. Maass, Campbell, and their co-workers *(1, 3)* have investigated the system $CaO$-$SO_2$-$H_2O$ extensively, also with their principal interest in the cooking process. Certain of their investigations, however, notably the solubility studies of Grieve *(7)*, fall in the ranges of temperature and concentration of interest in this paper. Smith and Parkhurst *(10)* have reported upon the solubility of sulphur dioxide in slurries of calcium and magnesium hydroxides, at alkali concentrations of from 0-1.0 *N*, and temperatures of from 5 to 60° C. Their results indicate that the equilibrium pressure of sulphur dioxide is directly proportional to the concentration of "true free" sulphur dioxide in the solution (sulphur dioxide in excess of that required to convert all the base to the bisulphite).

Conrad and Beuschlein *(4)* have investigated the solubility relationship for the system $CaO$-$SO_2$-$H_2O$ in the three-phase region (gas-liquid-solid) at the temperatures and concentrations of interest in cooking acid preparation. In later papers *(2, 5)* they were able to extrapolate their previous results into the two-phase region by assuming the direct proportionality of gas and liquid concentrations as proposed by Smith and Parkhurst. They reported no experimental results in this region, however.

A comparison of the results of certain of these previous investigations will be presented below, in discussing the results of this study. The discrepancies among them, although not major, are of sufficient magnitude to be critical in absorption studies, and it was considered desirable to redetermine the solubility relationship for this system.

## Experimental Procedure

The experimental procedure (for a different system) has been described in a previous paper *(12)*. It consisted essentially of the bubbling of a gas mixture of sulphur dioxide and nitrogen of constant composition through a lime slurry contained in a glass cell, until equilibrium between the two phases had been established. Then, by analysis of the liquor and of the exhaust gas, the solubility relationship, under the particular conditions employed, was determined.

Refrigeration-grade sulphur dioxide and water-pumped nitrogen were used to prepare the desired gas mixtures. The gases were drawn from cylinders, passed through flow meters to proportion the relative rates at the desired ratio, and mixed. The mixture was heated or cooled to the temperature of the experiment, saturated with water, and introduced to the equilibrium cell. Exhaust gas from the cell was discharged to the atmosphere through a water seal. The temperature-equalizing coil, the saturator, and the equilibrium cell were all immersed in a constant-temperature bath, thermostatically controlled to within ± 0.05° C. The liquor in the cell was agitated by means of a glass stirrer driven by a small electric motor.

For a given run, the concentration of combined sulphur dioxide was established by introducing measured quantities of C.P. calcium hydroxide and water to the cell at the start of the determination. A gas of fixed composition was then passed through the cell for about one hour after the last trace of lime had disappeared. After this period, samples of the liquor and of the effluent gas were taken in evacuated weighing bulbs and the size of the samples was determined by weight. The samples were then analyzed for total sulphur dioxide content by a modified Palmrose technique *(9)*, employing the addition of an excess of standard potassium iodate solution directly to the bulb, and back-titration of the iodine liberated with sodium thiosulphate. As a check on the original quantity of lime and water added, the liquor was also analyzed for combined sulphur dioxide

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* A portion of a thesis submitted by C. K. White, Jr., to the Massachusetts Institute of Technology, for the degree of Master of Science in Chemical Engineering Practice.

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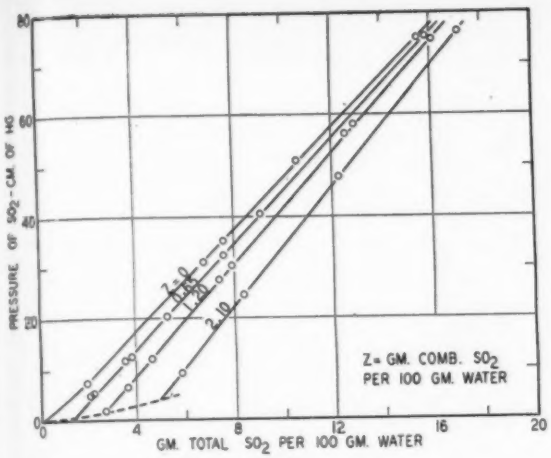


FIG. 1
**The Solubility Relationship at 10° C.**

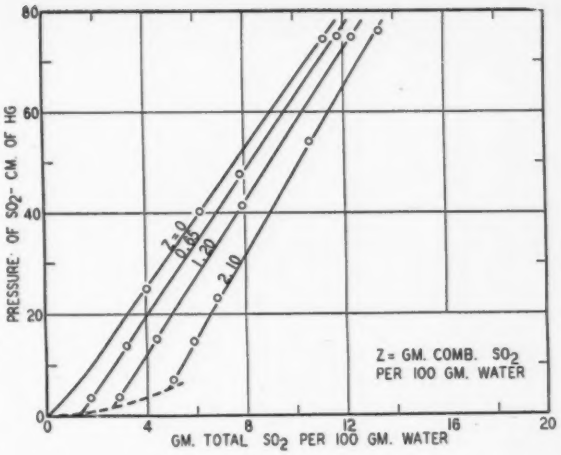


FIG. 2
**The Solubility Relationship at 18° C.**

by the Palmrose technique, in most of the runs made. The results of the gas analysis were used to calculate the sulphur dioxide pressure existing in the cell, utilizing the measured total pressure and correcting for deviations from the perfect gas laws through the data of Stewart and Maass *(11)*.

Since successive samples could be taken without disturbing the equilibrium, each experiment was continued, sampling at about half-hour intervals, until the results indicated that equilibrium had been attained. For a series of runs at one temperature and one value of the combined sulphur dioxide concentration, care was observed to approach equilibrium from opposite directions in successive determinations, in order to avoid possible supersaturation.

## Results and Discussion

The experimental results on the solubility of sulphur dioxide in calcium bisulphite solutions are presented in Table I, and in Figs. 1, 2, and 3. Each of the values given in Table I is the average of at least two determinations.

Figure 1 shows graphically the results obtained at 10° C. The equilibrium pressure of sulphur dioxide has been plotted against the total sulphur dioxide content of the solution, for four constant values of the combined sulphur dioxide concentration. For all the conditions plotted, only gas and liquid phases are present. The boundary of the three-phase region is shown by the dashed line in the lower left region, the location of which was taken from the data of Conrad and Beuschlein *(4)*. Figures 2 and 3 show (in a similar fashion) the results obtained at 18 and 25° C.

Examination of the figures shows that, for the three values of the combined sulphur dioxide concentration greater than zero, the pressure is a linear function of the concentration, within the precision of the data. If the straight lines of the graphs are extrapolated, each intersects the abscissa at a value of twice the combined sulphur dioxide concentration. Thus, in the two-phase region, the equilibrium pressure of sulphur dioxide appears to be directly proportional to the "true free" sulphur dioxide concentration of the solution, as concluded by Smith and Parkhurst. However, it has been pointed out by Beazley, Campbell, and Maass *(1)* that it is reasonable to expect these parameters to curve toward the origin as the region of solid precipitation is closely approached. Examination of the data yields some indication of this tendency in a few instances.

TABLE I.—EXPERIMENTAL RESULTS

| | 10.0° C. | | 18.0° C. | | 25.0° C. | |
|---|---|---|---|---|---|---|
| Combined $SO_2$ [1] | Total $SO_2$ [1] | Pressure of $SO_2$ [2] | Total $SO_2$ [1] | Pressure of $SO_2$ [2] | Total $SO_2$ [1] | Pressure of $SO_2$ [2] |
| 0 | 1.98 | 7.5 | 4.03 | 25.0 | 2.26 | 16.9 |
| | 6.70 | 31.1 | 6.21 | 40.3 | 5.34 | 44.4 |
| | 7.54 | 35.3 | 11.20 | 74.3 | 8.64 | 72.4 |
| | 10.53 | 51.0 | | | | |
| | 15.45 | 75.1 | | | | |
| 0.65 | 2.10 | 5.0 | 1.74 | 3.7 | 2.06 | 7.6 |
| | 2.23 | 5.5 | 3.21 | 14.0 | 3.05 | 16.7 |
| | 3.54 | 11.8 | 7.84 | 47.7 | 5.40 | 38.5 |
| | 3.81 | 12.6 | 11.79 | 74.9 | 9.32 | 74.2 |
| | 5.25 | 20.4 | | | | |
| | 7.53 | 32.4 | | | | |
| | 9.05 | 40.5 | | | | |
| | 15.80 | 75.7 | | | | |
| 1.20 | 2.69 | 1.9 | 2.86 | 3.8 | 2.90 | 5.3 |
| | 3.61 | 6.7 | 4.39 | 15.3 | 3.82 | 14.4 |
| | 4.60 | 12.2 | 7.89 | 41.5 | 5.91 | 34.7 |
| | 7.35 | 27.6 | 12.36 | 74.8 | 10.01 | 74.1 |
| | 7.94 | 30.4 | | | | |
| | 12.51 | 56.4 | | | | |
| | 12.85 | 58.3 | | | | |
| | 16.03 | 74.8 | | | | |
| 2.10 | 5.80 | 9.4 | 5.03 | 7.1 | 5.05 | 9.8 |
| | 8.33 | 24.6 | 5.89 | 14.6 | 5.70 | 16.8 |
| | 12.24 | 47.9 | 6.87 | 23.3 | 8.35 | 44.8 |
| | 17.10 | 76.3 | 10.62 | 54.1 | 11.26 | 73.9 |
| | | | 13.45 | 75.9 | | |

[1] All liquid concentrations are expressed in grams of $SO_2$ per 100 grams of water. Mill terminology is followed in defining total $SO_2$ as all the $SO_2$ in the solution, combined $SO_2$ as that required to convert all the lime to $CaSO_3$, and free $SO_2$ as the difference between total and combined.
[2] Partial pressure of $SO_2$ in centimeters of mercury.

Since the solubility of sulphur dioxide in water has been well established, the major reason for investigating this portion of the system was to provide a check on the techniques employed. The most reliable data on this system are considered to be those of Morgan and Maass *(8)*. Comparison of their results with those of this study shows excellent agreement, with no significant difference in the location of the pressure-concentration isotherms.

The results of this investigation have been compared with those of other investigations in Fig. 4 at a temperature of 25° C. and combined sulphur dioxide concentrations of 1 and 2 grams per 100 grams of water. The comparison at these conditions is typical of that at other temperatures and concentrations. The close agreement with the results of Conrad and Beuschlein *(2)* is notable. The agreement would appear to be within the precision of the extrapolation employed by those investigators. The results of Grieve *(7)* show somewhat high-

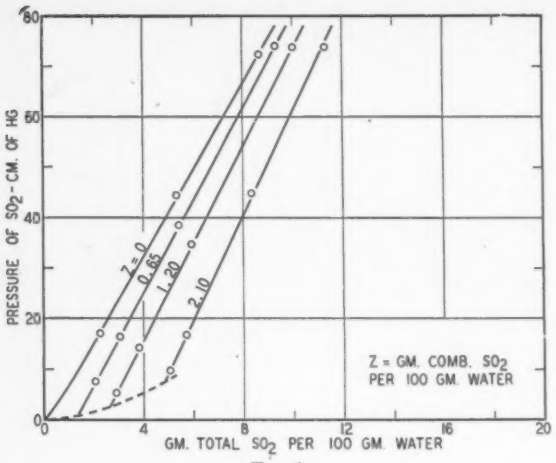


FIG. 3
**The Solubility Relationship at 25° C.**

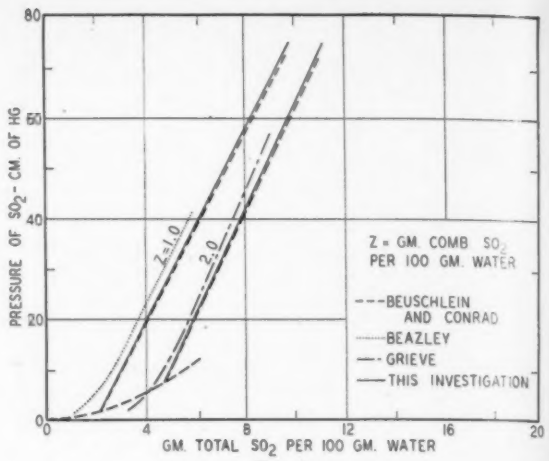


FIG. 4
**Comparison of Results at 25° C.**

er pressures at the higher combined sulphur dioxide concentration and show considerably more of a tendency to curve toward the origin at the lower end of the line. Grieve's results at a combined sulphur dioxide concentration of 1 gram per 100 grams of water are so nearly identical with those of this investigation as to obviate the necessity for a separate curve. Beazley's data *(1)* at the lower combined sulphur dioxide concentration are significantly different from those of this study. His data were not extended to the higher combined value.

Since most mills employing a slurry system of acid preparation use a dolomitic lime, it was considered desirable to study briefly the solubility relationship for this case. A typical mill lime was used, analyzing 56% CaO and 40% MgO, and a series of four runs was made at a temperature of 25° C. The results are presented in Table II.

TABLE II

| Combined $SO_2$, g./100 g. $H_2O$ | Total $SO_2$, g./100 g. $H_2O$ | Pressure of $SO_2$, cm. of Hg |
|---|---|---|
| 1.50 | 4.19 | 12.65 |
| | 5.68 | 26.80 |
| | 8.84 | 59.10 |
| | 10.40 | 74.02 |

These results are in excellent agreement with those presented in Table I and bear out the conclusion previously expressed by Smith and Parkhurst—namely, that the presence of magnesium hydroxide brings about no change in the solubility relationship.

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## New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

William E. Hamilton, Chemical Engineer, Hercules Powder Company, Paper Makers Chemical Dept., Hoyyoke, Massachusetts, a 1941 graduate of the University of Missouri.

Edward C. Bullard, Sales, Perkins-Goodwin Co., New York City, a 1940 graduate of the University of Maine.

Joseph A. F. Gardner, Chief, Division of Wood Chemistry, Forest Products Laboratories of Canada, University of British Columbia, Vancouver, B. C., Canada, a 1942 graduate of the University of British Columbia with an M.A. degree. He received his Ph.D. Degree from McGill University in 1944.

Norman E. Siems, Technical Representative, Philadelphia Quartz Co., Philadelphia, Pennsylvania, a 1937 graduate of the University of Rochester.

Lawrence Soos, Jr., Junior Wood Pulp Engineer, Johns-Manville Corp., Manville, New Jersey, a 1943 graduate of the New York State College of Forestry.

William E. Wakefield, Chief, Division of Timber Mechanics, Forest Products Laboratories of Canada, Ottawa, Ont., Canada, a 1913 graduate of Derby Technical College.

Stanley B. Huss, Sales Engineer, E. W. Twitchell, Inc., Philadelphia, Pennsylvania. Attended Massachusetts Institute of Technology.

Francis I. Kittredge, Sales Engineer, General Electric Co., Philedalphia, Pennsylvania, a 1922 graduate of Worcester Polytechnic Institute.

Lancelot O. Rolleston, Research Chemist, International Paper Co., Glens Falls, New York, a 1923 graduate of McGill University.

Dorothy B. Skau, Librarian, USDA Library, Southern Regional Research Laboratory, New Orleans, Louisiana. Attended Newcomb College and Louisiana State University.

John T. Stearns, Technical Director, Research Bureau, Inc., Stamford, Connecticut, a 1922 graduate of Swiss Polytechnic Institute, Zurich, Switzerland.

Donald A. Washburn, Chief Engineer, Plastic Film Corp., Plainfield, Connecticut. Attended Massachusetts Institute of Technology.

## TAPPI Notes

C. M. Connor, formerly of the Glassine Paper Company is now in the research and development department of the Ohio Boxboard Company, Rittman, Ohio.

Wm. H. McPherson, formerly of the Institute of Paper Chemistry is now in the research department of the International Paper Company, Glens Falls, N. Y.